TECHNOLOGY TRAINING
& SUPPORT SERVICES

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Service Manual for the Accutherm Ultra Printer

2-ACU-003-01
January 2014

GTECH®

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Revision History

This document describing the Accutherm Ultra has a revision number. Each time this document is updated, the document revision number is updated. The number below represents the current revision of this manual.

Service Manual for the Accutherm Ultra Printer
2-ACU-003-01

For future documentation revisions, the last two digits of the number above will increment by 1 (for example, when revision 01 is revised, the last two digits in the number above will become 02). Revision details are tracked in the table below.

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2-ACU_003_01	Release as updated Service Manual	1/28/2014	J.Pearson

No provisions exist for automatic, on-site updates of this manual.

This manual is intended for use as a training guide. Accordingly, although we strive to be as accurate as possible at print time, product information contained in this manual should not be construed as official product specification information or as legally-binding promises of product performance. Each chapter also has a revision level since chapters may be edited before new manuals are published. If you believe your manual is out of date, contact GTECH Learning Technology Services to obtain the latest edition level.

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To suggest or request updates to this manual, please contact your Field Services Engineering (FSE) Representative or send an email to **#Field Services Engineering** or **ttssdocs@gtech.com** and it will be forwarded**.**

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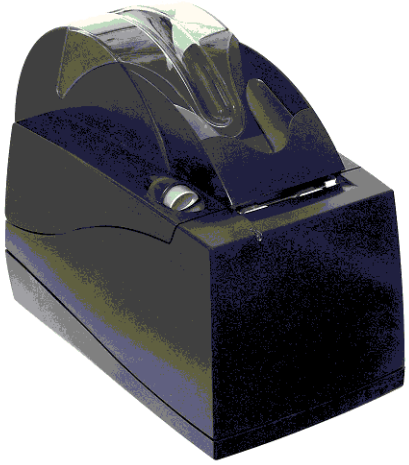
Acronyms & Abbreviations

1

Introduction

The Accutherm® Ultra Printer is a stand-alone thermal printer designed for use with GTECH Lottery Terminals for printing lottery receipts.



Overview of Accutherm Ultra

- Print Line Width— 640 dots @ 8dots/mm centered on 82.5 mm (3.25 in) paper.
- 7.5 inch diameter paper roll
- Jam Detection
- Full cut auto-cutter
- Ticket Stacker with capability > 75 tickets
- User Flash Memory
  - 1M bytes User Graphics Memory
  - 128K bytes User Data Memory
- Font/System Flash Memory:
  - 2M bytes for Fonts and System files.
- Manual configuration mode
- Self test diagnostics
  - Loadable Enhanced Diagnostics
- Internal Auto-Ranging (90-264 VAC) power supply
- USB interface built into main controller PCB
- Power and Error LED
- Easy paper loading

Mechanical Specifications

- **Height:** 8.81" (223.77 mm)
- **Width:** 6.5" (165.1 mm)
- **Depth:** 13.26" (336.80 mm)

- **Weight**: Approximately 4.9 lbs, 2.22 kg.
- **Interface Type**: USB
- **Printer Type**: Fixed 80 mm.linear thermal head.

Environmental Specifications

- **Operating Temperature Range**:5°C ~ 50°C (41°F ~ 122°F)
- **Shipping/Storage Temperature Range**:-10°C ~ 50°C (14°F ~ 122°F)
- **Operating Humidity Range**:10% ~ 90% @ 40°C (104°F) non-condensing only
- **Shipping/Storage Humidity Range**:10% ~ 90% non-condensing only (excluding paper)

Electrical Specification

AC Power Requirements: The Accutherm Ultra Printer is designed to be AC self-powered. The printer is equipped with a universal input power supply that is designed to operate worldwide without modification.

Supply Voltage Rating (VAC)	**Supply Voltage Range (VAC)**	**Frequency (Hz)**	**Power Consumption**
100-240	90-264	47-63	20 watts

Standard Printer Features

Standard features of the Accutherm® Ultra printer include:

- High-speed (10 inches per second) thermal receipt printing
- Black dot - Top of Form and Paper Low Sensing capabilities
- Jam Detection
- Multiple barcode printing capabilities
  - 2 of 5
  - EAN-8
  - EAN-13
  - UPC-A
  - 3 of 9
  - UPC-E
  - Codabar
  - Code 128
  - Code 93
  - PDF417 2D Stacked
  - Data Matrix
  - RSS GS1
- Print-Line Width of 640 dots @ 8 dots/mm centered on 3.25 in (82.5 mm) Paper
- Up to a 7.5 in (190 mm) Diameter Paper Roll
- Long-life auto ticket cutter
- Standard variable length stacking module capable of handling from 2.75 to 10 inch (70 to 254 mm) length tickets
- Ticket stacking capability (greater than 75 tickets)
- Modular printer design for easy servicing
- Internal Auto-Ranging (90-264 VAC) Power Supply
- Power and Error LED Indicator
- User Flash Memory
  - 1M bytes User Graphics Memory
  - 128K bytes User Data Memory
- Font/System Flash Memory:
  - 2M bytes for Fonts and System files.

- Manual configuration mode
- Self test diagnostics
    - Loadable Enhanced Diagnostics

- USB interface built into main controller PCB

Mechanism

This section explains the Accutherm Ultra's theory of operations.

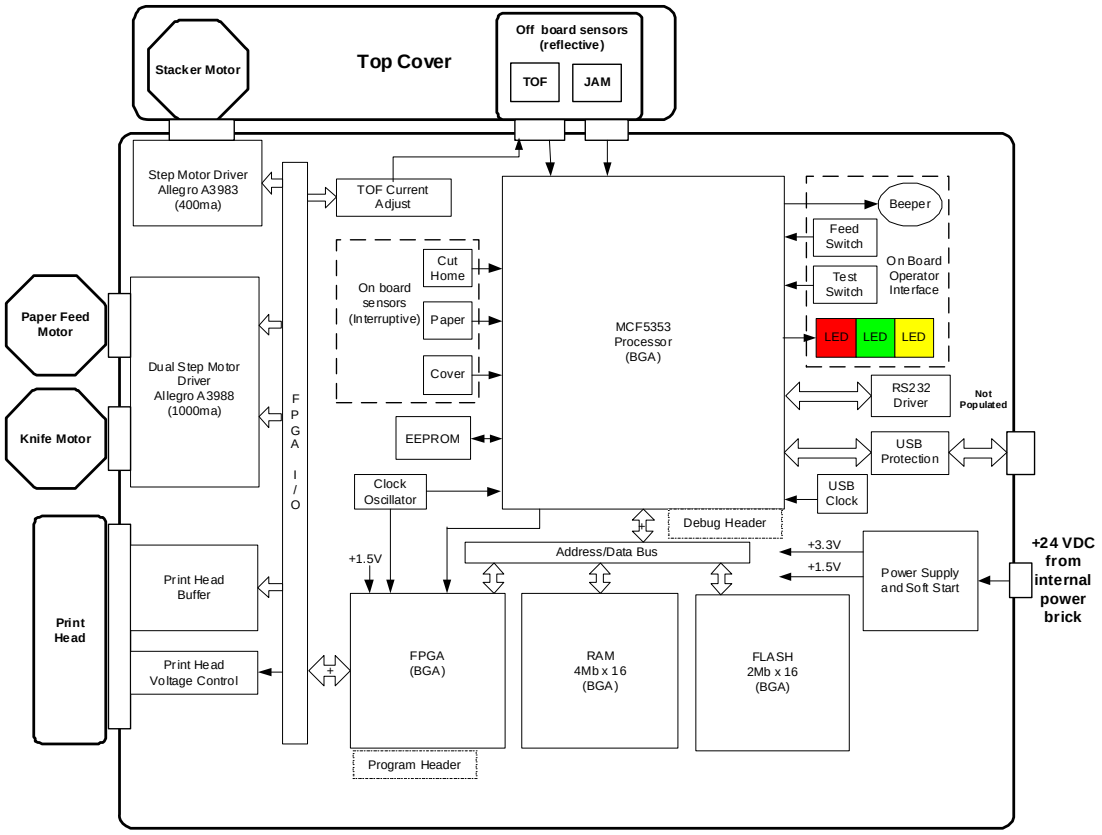


Figure 1-1. Printer Block Diagram

Print Head

The print head in the Accutherm Ultra is a high speed, thick film device configured as single row of 640 dots spaced at 8 dots/mm for a total printable width of 80mm (3.15"). Print data is sent from the controller board as a serial data stream at 8 MHz.The head elements are then activated by signals from the main controller board to form the image on the paper. The Accutherm Ultra uses a two level energy control system to compensate for dot history with all timing controlled by the controller board electronics. The head also contains a thermistor, which is used to monitor the temperature of the head substrate. Dot energy is continually adjusted based on head temperature, supply voltage, dot history, and paper sensitivity. The print head connects to the controller through a 28 position Flexible Flat Cable (FFC).

Paper Motion

Paper motion is accomplished by a hybrid, 1.8 degree step motor running at a maximum speed of approximately 3000 steps per second. The gear train is designed such that one motor step equals.0833mm of paper motion resulting in a paper feed speed of 250 mm/sec (10 in/sec).

Cutter

The cutter mechanism consists of a rotary blade mounted to the mechanism, which operates against a fixed blade located in the paper cover. The rotary blade is driven by a 7.5 degree “tin can” step motor mounted to the mechanism frame, acting through a lever arm and follower. The rotary blade home position is determined by means of an optical sensor located on the controller board and a flag located on the cutter drive gear. The motor operates one direction to activate the cutter and then reverses direction to return the cutter to its home position with a total cut cycle time of approximately 350 ms.

Sensors

There are two types of sensors used on the Accutherm Ultra printer. One type is mounted directly on the controller board and is activated by mechanical flags on the mechanism. These sensors are optical interruptive type and are used to detect Cutter Home, Paper Out, and Cover Open conditions. The second type are mounted in the printer mechanism and are connected by harnesses to the controller. These are optical reflective sensors, which are used to detect black marks and paper low stripes on the reverse side of the paper, as well as the presence of tickets in the printer. The black mark/paper low detection sensor can be auto-calibrated using on-board diagnostics**.**

Power Supply

The power supply for the Accutherm Ultra is a small, universal input, fully enclosed module located within the printer cabinet. The 24 VDC output of the supply connects to the controller board by means of a cable. The AC input connector on the supply is accessible from the rear of the printer and accepts a Standard, C6 style, 3-wire power cord.

Control Electronics

Overview

The printer has a main controller board containing microprocessor, FPGA, memory, motor drivers, and sensor conditioning circuits used to control the mechanism. The basic system clock was chosen to be 19.6608 Mhz. This clock is multiplied in the main processor with a PLL to maximize execution speed and used by the FPGA for optimum thermal print head load speed. External communications is USB only.

Processor and Memory

The processor used in the Accutherm Ultra is a Motorola ColdFire MCF5253 running at 140 Mhz. with integrated USB controller. The processor interfaces, through a 16 bit external bus, to a 64Mb Synchronous Dynamic Ram (SDRAM), 32Mb of Flash Memory, 8Kb of EEPROM, and a 2,910 logic element Field Programmable Logic Array (FPGA). The processor contains general purpose I/O pins which are used to directly control many of the printer functions including:

- Status LEDs
- USB Communications
- Print Head Data and Timing
- Print Head Temperature and Voltage monitoring
- Programming the FPGA

The remaining printer functions are controlled though the FPGA including:

- Stacker motor control
- Cutter motor control
- Paper feed motor control
- Thermal print head loading and protection

Print Head Interface

Print data is formatted by the MCF5253 and transmitted to the FPGA through a byte serial, memory mapped I/O interface for each dot row. This interface allows rapid transmission of data with minimal software overhead. Once the transmission is completed, the FPGA parses, loads, and latches the data into the print head registers using two simultaneous serial channels. Strobe timing (dot energy control) is calculated and applied to the print head by the MCF5253. For each line of dots printed, the head is energized twice to compensate for dot history. The MCF5253 provides a watchdog timer that is gated in the FPGA with the strobe signals to protect the thermal print head from overheating. All head interface lines are buffered and resistance matched to the connecting ribbon cable.

Motor Controllers

Both the paper feed and cutter step motors are controlled by an Allegro A3988 DMOS motor driver that provides two dual-bridge, bipolar, PWM, micro-stepping motor drivers. These drivers operate from the 24-volt supply and apply up to 1.5A/phase of output current. The drivers are micro-step capable; the controller must provide both phase and current level information to the driver. Stepper motor control lines are driven by FPGA outputs latched from MCF5253 processor.

The paper feed motor is set for a maximum motor current of 1A/ phase. Control lines operate this stepper motor in ¼ step mode up to approx. 500 equivalent full steps/sec followed by modified half step mode up to 3600 equivalent full steps/ sec.

The cutter motor circuit is also set for a maximum current level of 1A/ phase. Control lines operate this stepper motor in modified half step mode up to approx. 1000 equivalent full steps/sec.

The stacker motor is controlled by a dedicated Allegro A3983DMOS micro-stepping motor driver with translator. The driver is configured to operate the stacker motor in modified half step mode at a maximum current of 500ma/phase and is matched for stepping speeds to receive tickets passed off from the paper feed motor.

Sensor Interface

There are three, on-board infrared optical interruptive sensors, which are activated by plastic flags attached to the mechanism. These devices have an open collector, photo transistor output and provide a low level signal when blocked. The output switches to a high level when the sensor is unblocked by a flag. The outputs of these sensors are buffered with Schmitt triggers before being presented as inputs to the MCF5253. The state of these sensors is as follows:

Table 1-1. Sensor State

Sensor	Blocked	Unblocked
OP1	Cutter home	Cutter not home
OP2	Paper cover closed	Paper cover open
OP3	Paper present	Paper not present

The controller board also has connections for two external optical reflective sensors. One sensor is used to detect the Top of Form (TOF) mark and paper low stripes on the back of the paper. The other sensor is used to detect paper jam (JAM) conditions.

The LED current of the TOF/Paper Low sensor is adjustable by the processor in 8 steps from 8ma to 21ma and is auto calibrated using diagnostics resident in the printer. The output of this sensor is presented in analog form to the MCF5253's AD converter for calibration and Schmitt trigger buffered on another input for fast reading during normal operation.

The LED current of the JAM sensor is fixed to approx. 18ma. Its output is Schmitt trigger buffered for fast reading by the MCF5253 processor.

Power Supply Circuitry

There are four different power supply voltages used in the Accutherm Ultra.

Table 1-2. Power Supply Circuitry

Voltage	Derived From	Used For
24 VDC	Modular Power Supply	Print Head, Step Motors
3.3 VDC	Derived from +24V using a buck converter circuit	Processor I/O,USB communications, SDRAM, flash memory, print head logic, sensors

Table 1-2. Power Supply Circuitry

Voltage	Derived From	Used For
1.8 VDC	Derived from 3.3V using an internal regulator resident in the MCF5253	Processor core
1.5 VDC	Derived from 3.3V using a TI TPS73601 low drop linear regulator	FPGA core

A power supply supervisor chip monitors the 3.3V and provides reset control for the processor and FPGA.

Communications Interface

The communications interface is resident on the main controller PCB. The Accutherm Ultra is available with one interface; USB.

2

Installation

Introduction

Follow the instructions in this chapter in order to properly install the Accutherm® Ultra printer. The Accutherm® Ultra can be used with a number of GTECH terminals, including the GT1100 and GT1200.

GTECH hardware products and peripherals require properly grounded outlets. It is critical that this grounding requirement is enforced on all installations of GTECH hardware products and peripherals.

Installation Instructions

The following steps describe the procedure for installing the Accutherm Ultra printer:

1. Remove the printer and cables from its packaging.

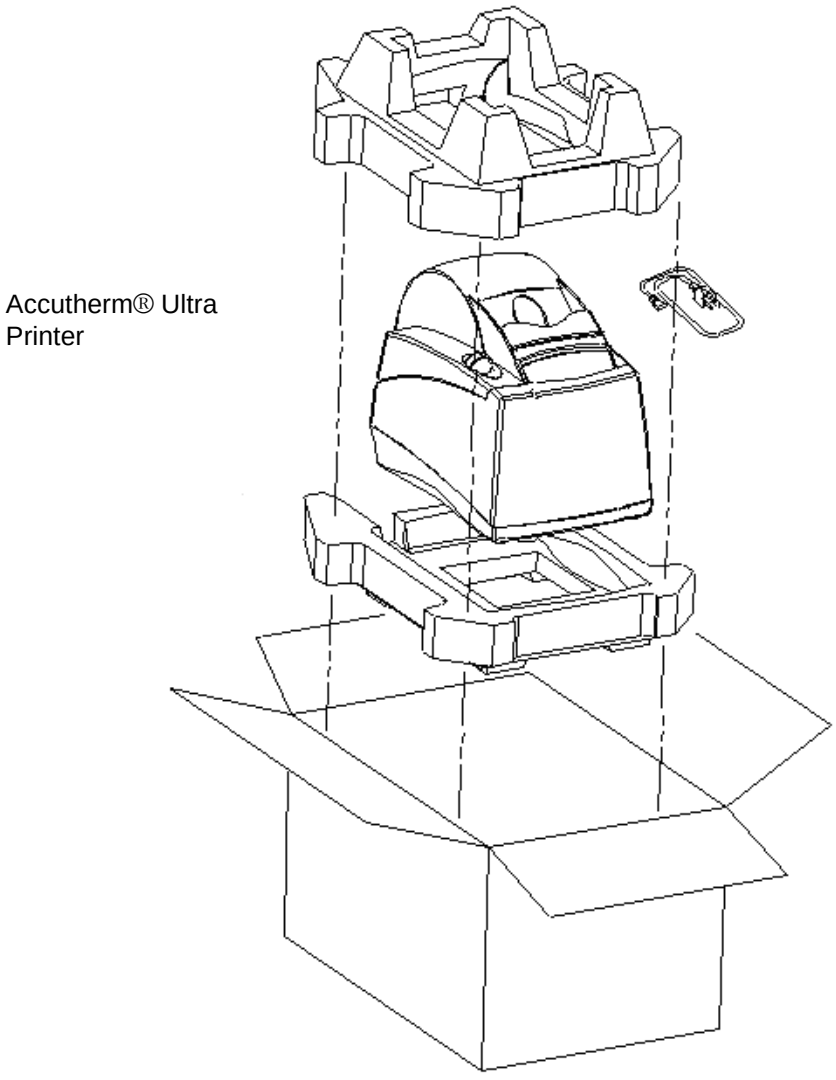


Figure 2-1. Remove Accutherm Ultra from Packaging

2. Move the Strain Relief lever (Figure 2-2) to the left and then plug the power cord into the power connector, located at the rear of the printer.

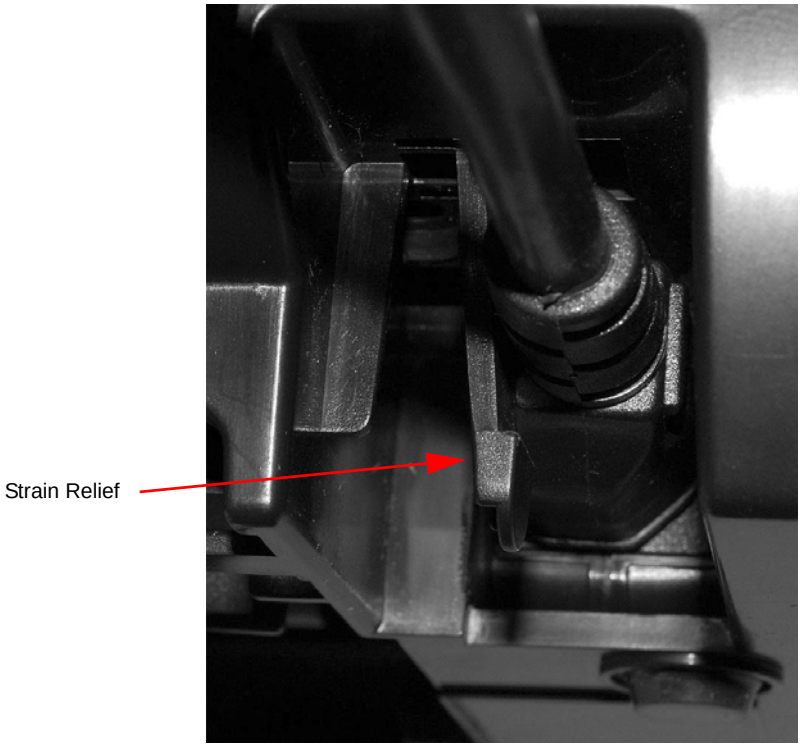


Figure 2-2. Plug Power Cord into Printer

3. Plug the printer's USB data cable into the Main Controller PCB, located on the bottom of the Accutherm Ultra (Figure 2-3).

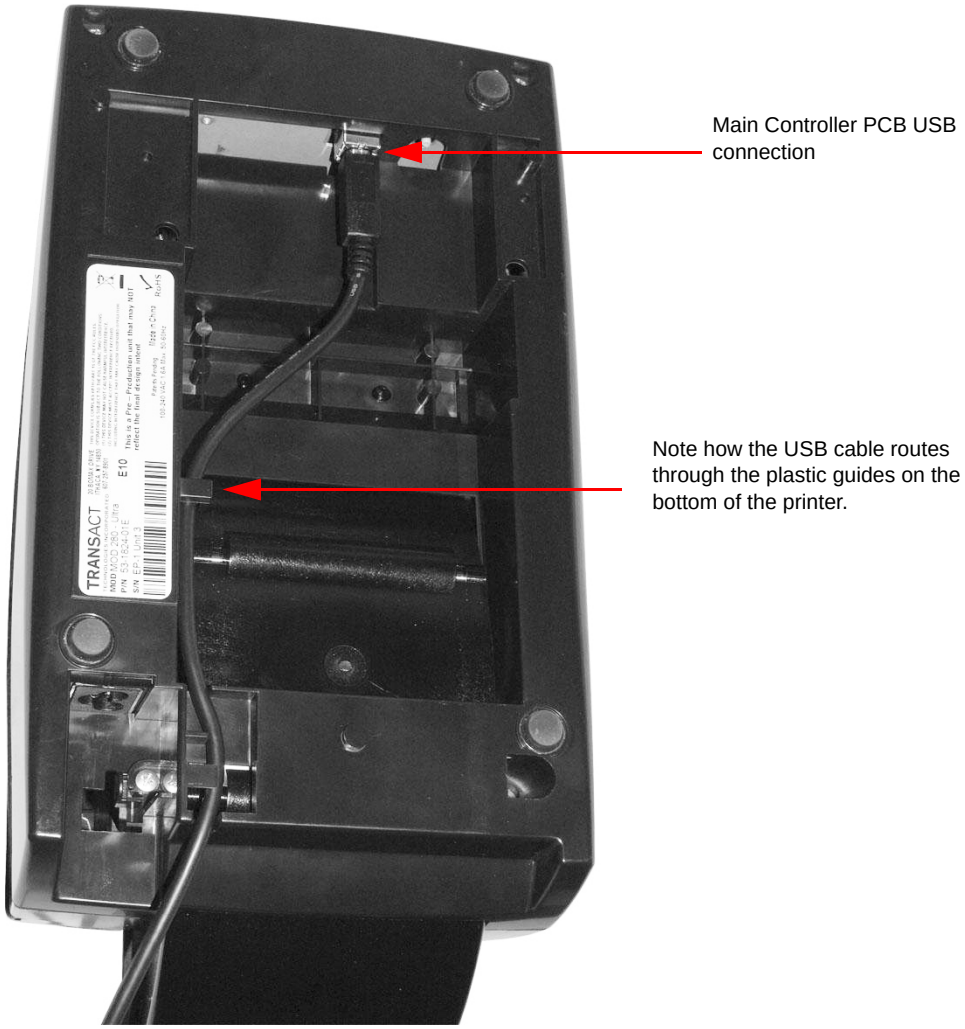

Main Controller PCB USB connection
Note how the USB cable routes through the plastic guides on the bottom of the printer.

Figure 2-3. Plug USB Cable into Printer

4. Plug the Accutherm Ultra's USB data cable into the USB connector on your terminal. See Figure 2-4 and Figure 2-5 for GT1200 and GT1100 connections.

Figure 2-4. GT1200 USB Connection

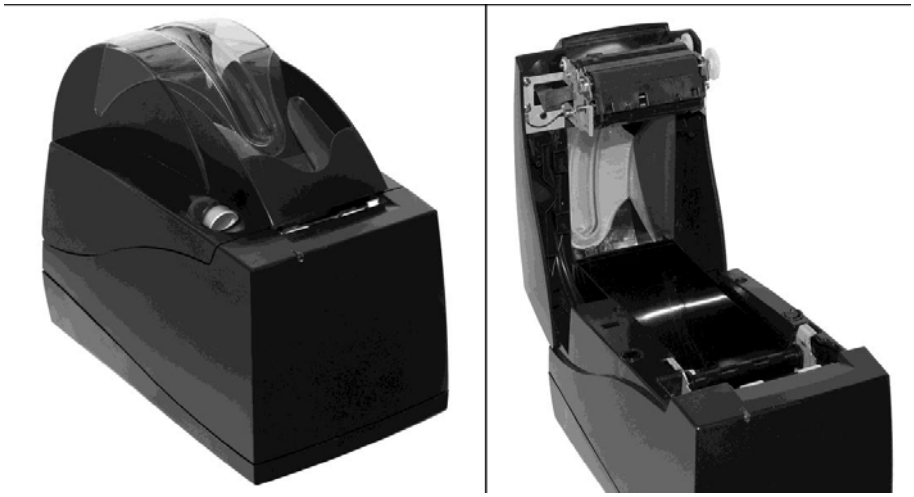
Figure 2-5. GT1100 USB Connections

5. Install a paper roll into the printer (see page 2-6 for paper loading instructions).
6. Complete all required connections for the terminal.
7. Apply power to both pieces of equipment.

Loading Paper

Follow the instructions below to load a new roll of paper into the Accutherm® Ultra printer. Reference the photos that follow each step for the illustrated procedure.

1. Press back on the gray cover latch button and raise the paper cover to the open position.



2. Tear off the first layer of the paper roll. Place the paper roll into the printer, so that the paper unwinds from the bottom (front).

3. Leave a few inches of paper outside of the printer.

4. Close the paper cover firmly so that it latches securely. Paper will feed automatically to align itself and then the printer will automatically cut off the excess paper.

3

Configuration

This chapter does not apply to the Service Manual for the Accutherm Ultra Printer, as all printers are configured at manufacturing and updates are maintained via the lottery terminal to which it is connected.

4

Operation

PLEASE NOTE!

There are no operating instructions for the Accutherm Ultra Printer, other than installation and configuration. Please see **Chapter 5, Diagnostics** and **Chapter 8, Troubleshooting** for information on problems encountered with powering up and using the printer.

5

Diagnostics

The Accutherm® Ultra Printer provides printer self-test and diagnostics features.This chapter provides information about these tests.

- “Printer Self Test” on page 5-2
- “Normal Operation Errors” on page 5-4
- “Extended Diagnostics” on page 5-6

Printer Self Test

The Accutherm® Ultra printer is configured with two self-test operations.

- The first occurs each time the printer cover is closed and paper is present after which, a receipt is printed that contains a header and the printer firmware revision and serial number.
- The second self-test is available by pressing the Service button as shown in Figure 5-1 on the underside of the printer, at which time the printer enters self-test mode.

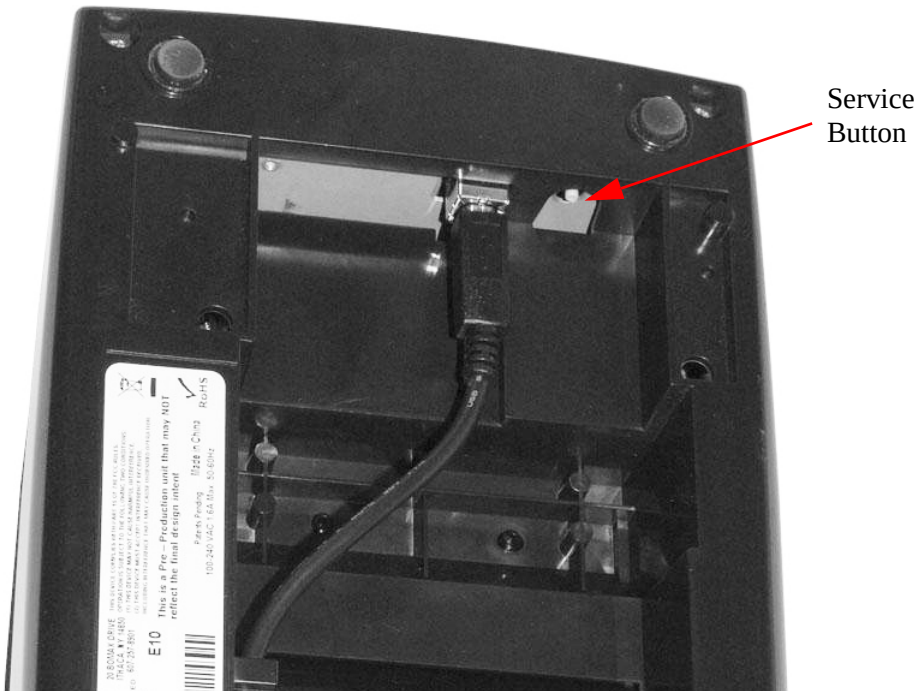


Figure 5-1. Service Button Underneath Printer

When servicing the printer, you should verify the firmware version and serial number that are printed on the receipt.

Self-Test Mode

Pressing the Service button on the underside of the printer activates the self-test mode that provides several print tests, plus access to the printer configuration and factory tests.

To access the printer test display:

1. Press and hold the Service button to begin scrolling through the tests.
2. To select a test release the Service button at the desired test prompt, then follow the instructions.

The available printer test options include the following:

- **Print Test Ticket -** Prints a sample ticket
- **Print GTECH Ticket -** Prints a GTECH sample ticket
- **Configuration -** Enters Configuration mode.
- **User Stats** – Provides information for 3 Groups

  Group 1:
  - Number of Line Feeds
  - Characters Printed
  - Cover Opens (sensor triggers)
  - Paper Out (sensor triggers)

  Group 2:
  - Auto Cutter Cycles
  - Auto Cutter Faults
  - Auto Cutter ReHome

  Group 3:
  - Level 1 Jams
  - Level 2 Jams

- **Print Head Test -** Prints a test pattern to verify that all print elements are working and clean.
- **Marker Calibration -** Verifies that the Top of Form marker sensing is working.
- **Continuous Print -** Prints the test ticket continuously to verify stacker functionality.

Normal Operation Errors

During Normal operation, the Power LED remains on unless an error is indicated. There are two classes of errors: soft errors and hard errors. Soft errors are recoverable without power cycling the printer. Hard errors are not recoverable without removing power from the printer, correcting the problem, and reapplying power.

- Error Indicators
  - Power -> Green
  - Error -> Red
  - Paper -> Yellow

Soft Errors

Soft errors may be recovered by the host or by opening and closing the printer cover. All of these errors are indicated by a 5 second repeating blink pattern.

Soft Error State	**Indicators**		
	Power (Green)	**Error (Red)**	**Paper (Yellow)**
Powering Down	Fast Blink	On	Off
Cover Open	4 Blinks	On	Off
Print Head Over Temp	9 Blinks	Slow Blink	Off
Power Bad	2 Blinks	Slow Blink	Off
Out of Paper	2 Blinks	On	On
Jam	5 Blinks	On	Fast Blink
Missed Top of Form (TOF)	6 Blinks	Off	Fast Blink
Invalid Command	7 Blinks	On	Fast Blink
Paper Low Error	On	On	Slow Blink
Paper Low	On	Off	Slow Blink
Electronic Journal Low	On	Off	2 Blinks

Hard Errors

Hard errors have a similar pattern to Soft errors only they are slower and repeat every 10 seconds. In general they occur during level 0 diagnostics and are not recoverable.

Hard Error State	**Indicators**		
	Power (Green)	**Error (Red)**	**Paper (Yellow)**
EEPROM read fault	2 Blinks	On	Off
EEPROM write fault	3 Blinks	On	Off
Error Vector Taken	4 Blinks	On	Off
Knife Error	5 Blinks	On	Off
Flash File system Error	7 Blinks	On	Off
Flash Read/Write Error	9 Blinks	On	Off
Dynamic Memory Allocation	10 Blinks	On	Off
Font system Fault	11 Blinks	On	Off
Static Memory Allocation	12 Blinks	On	Off
Communications Fault	14 Blinks	On	Off
Kernel Fault	15 Blinks	On	Off
Head Connection Fault	16 Blinks	On	Off

NOTE! When the YELLOW and RED LEDs are illuminated at the same time, the LED will illuminate as ORANGE/AMBER.

Extended Diagnostics

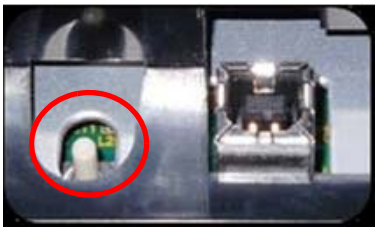
Accutherm® Ultra Extended Diagnostics are performed using the diagnostics on the terminal to which the printer is connected. The printer may also be tested using the general Terminal Qualify Diagnostics and further tested through the Extended Diagnostics Peripherals menu.

6

Download

Downloads occur automatically via the terminal application to which the printer is connected. Should the RLT need to update the firmware manually, please contact your Field Services Engineering (FSE) Representative or send an email to **#Field Services Engineering** to obtain the latest and greatest firmware version for your site.

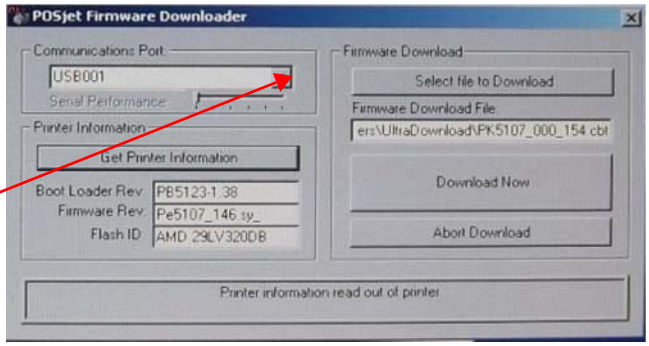
AccuTherm® Ultra Firmware Install Procedure



1. Connect the printer data cable to printer and USB port in PC.
2. Connect the power cable to printer (do not connect to AC power yet).
3. Press and hold the diagnostics button while applying power to printer.
4. The LED on the front of printer will flash slowly. Release the diagnostics button (printer is in download mode (Transact boot loader)).
5. The USB Link is active and will communicate with the PC.

You must have the printer connected before starting the download program. Otherwise, the download program will not see the USB port.

6. Run Download.exe.
7. Select the USB001 port or the active USB port from the drop-down menu.



8. **Click** "Get Printer Information" to verify that you can communicate with the printer.
9. To select firmware version:
   a. click the "Select file to download" button.
   b. Open the file containing the files you exported **to the PC.**
   c. Double click PK5107_000_162Full.cbt file and select "Download Now".

DO NOT INTERRUPT THE DOWNLOAD

The firmware file will be transferred to the printer. It is self verifying and will not be activated if it is incorrect. The download program is not aware of the verification process and assumes it loaded correctly.

You MUST wait at least 10 seconds after the download program says it's done as the printer takes 5 or 10 more seconds to finish writing the update to flash. The easiest way to tell when the printer is done is to press the "Get Printer Information" button after the download and when the printer responds it's done.

ADDITONAL INFORMATION:

The update has not yet occurred so the old revisions will be displayed, but that's OK. You can now power cycle the printer. (Wait at least 10 seconds before re-connecting printer power for printer power supply to completely discharge). Verify that the new firmware is active by opening and closing the cover, then reading the printout.

7

Disassembly

Warranty Information

The Accutherm® Ultra Printer is under warranty from the manufacturer. Prior to performing any printer disassembly, you MUST verify that the printer is out of warranty with your Technical Services Manager. Performing any of the steps in this chapter may VOID warranty and is therefore PROHIBITED until advised by Management.

Caution: The Power Supply is the only sub-assembly approved to be replaced in the field (FST) after warranty. All other subassemblies must only be replaced by an RLT.

Before disassembling any part of the printer, be sure the power is turned off. The Controller Board, the Thermal Print Head, and the Interface Board can be damaged by static electricity. ***Observe ESD precautions. Wear a grounded wrist strap and use a static mat or other protected work surface.***

Thread Forming Screws - To prevent stripping the mating holes in plastic components when replacing screws, turn the screw counter-clockwise until a “click” is heard, then tighten normally.

Required Tools

The following tools are required to disassemble the Accutherm® Ultra printer:

- #1 Phillips screwdriver
- 5.5mm nut driver or wrench

Disconnect the Power Cable

To disconnect the power cable:

1. Unplug the power connector, located at the rear of the printer.
2. Move the strain relief to left while disconnecting the cable (Figure 7-1).

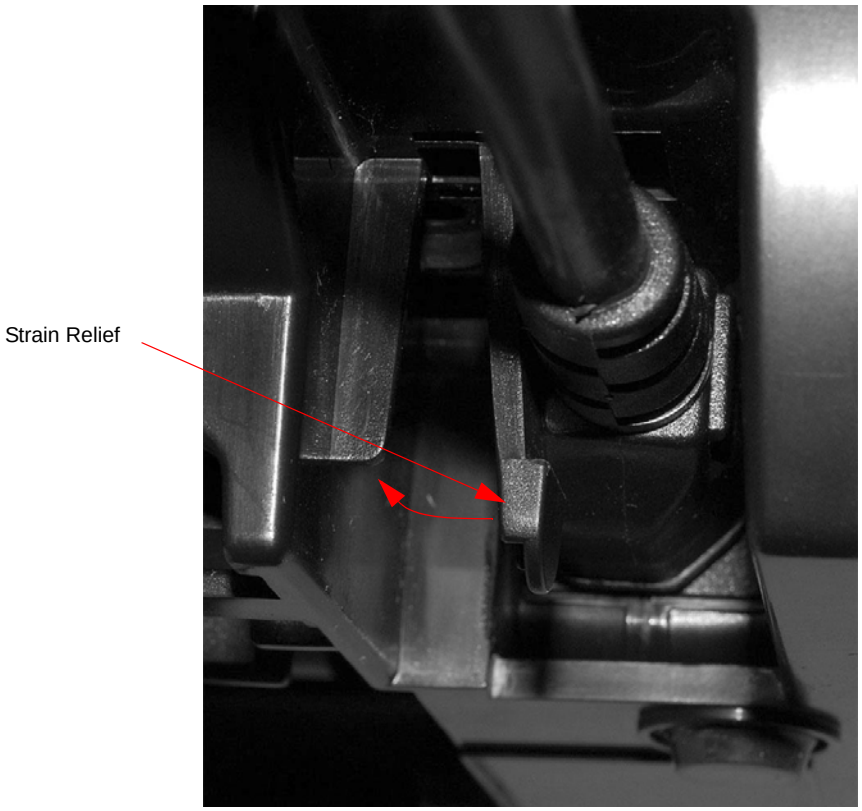


Figure 7-1. Disconnect Power Cable

Disconnect the USB Communications Cable

To disconnect the USB data cable:

Unplug the USB cable from the Main Controller PCB, located on the bottom of the printer (Figure 7-2).

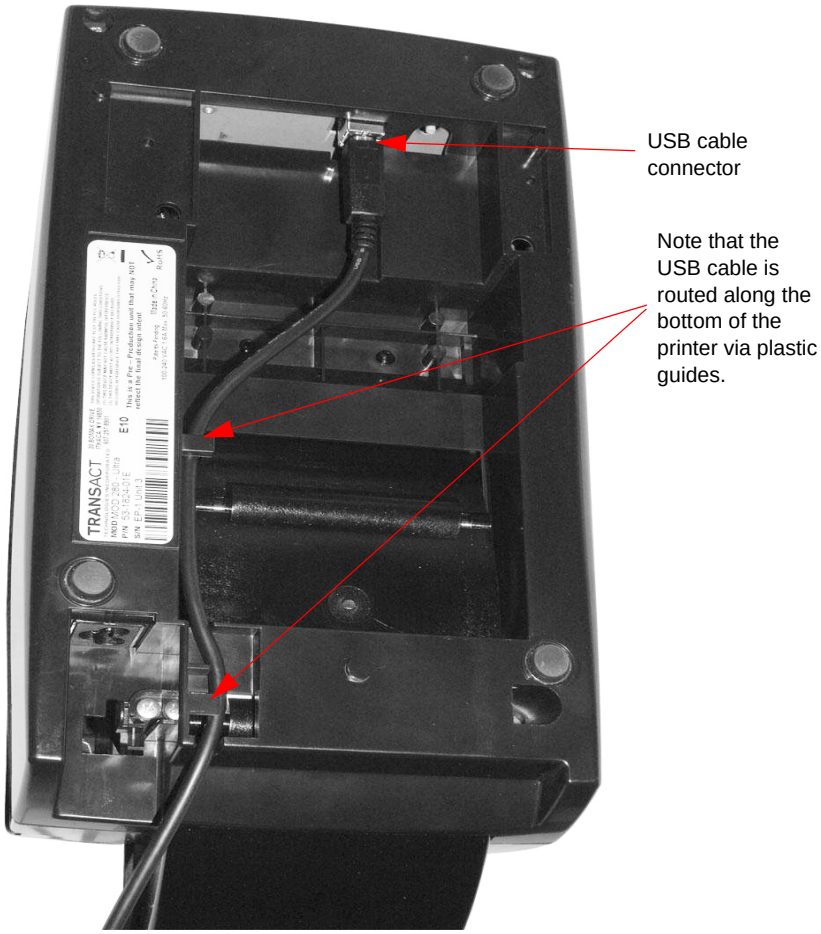


Figure 7-2. Disconnect USB Cable

Remove the Cover Assembly

To remove the cover assembly:

1. Open the Paper Cover Assembly and remove the Paper Roll, if present.
2. Turn the printer over and remove the four (4) #6 screws holding the Base to the Midframe (Figure 7-3).

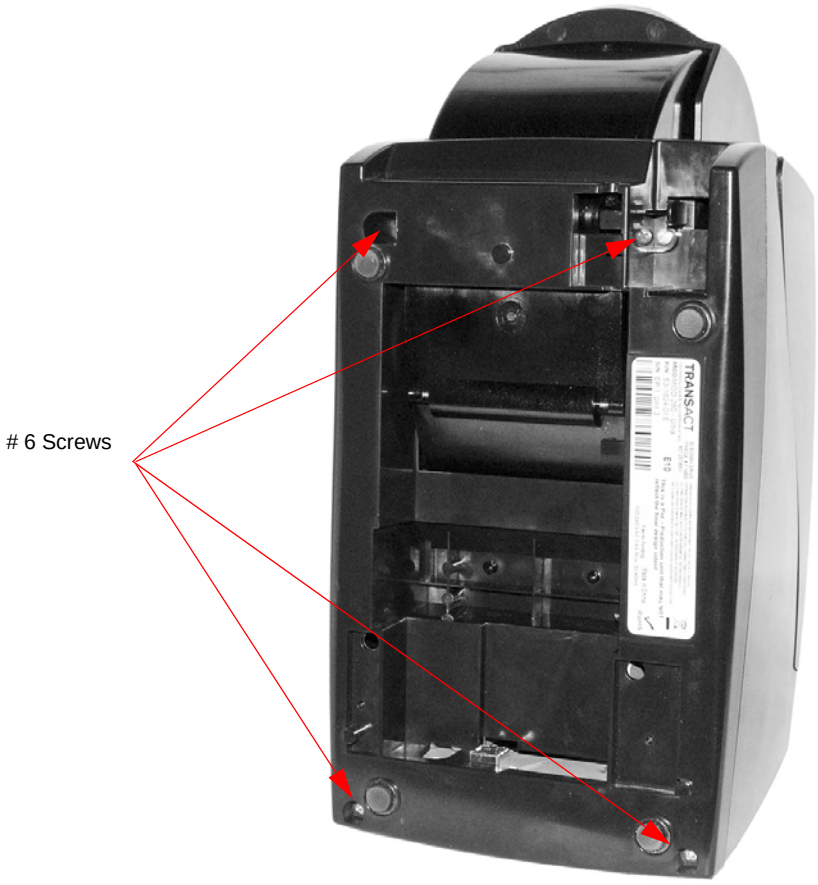


Figure 7-3. Remove Screws Holding Base to Midframe

3. Unscrew two (2) #6 thread-forming screws, holding Mid-frame to Paper Bucket (Figure 7-4).

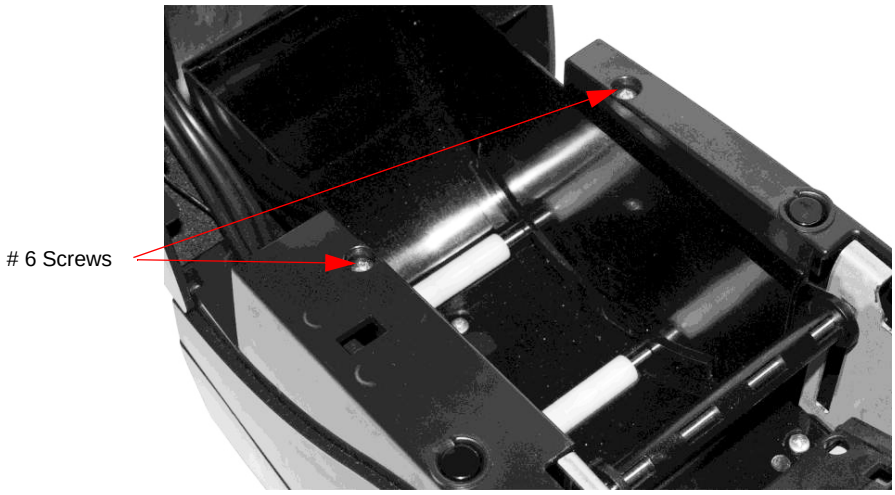


Figure 7-4. Remove Screws Holding Midframe to Paper Bucket

4. Lift and rotate the Mid-frame/Cover Assembly sideways, and then separate it from the Base Assembly, as shown (Figure 7-5).

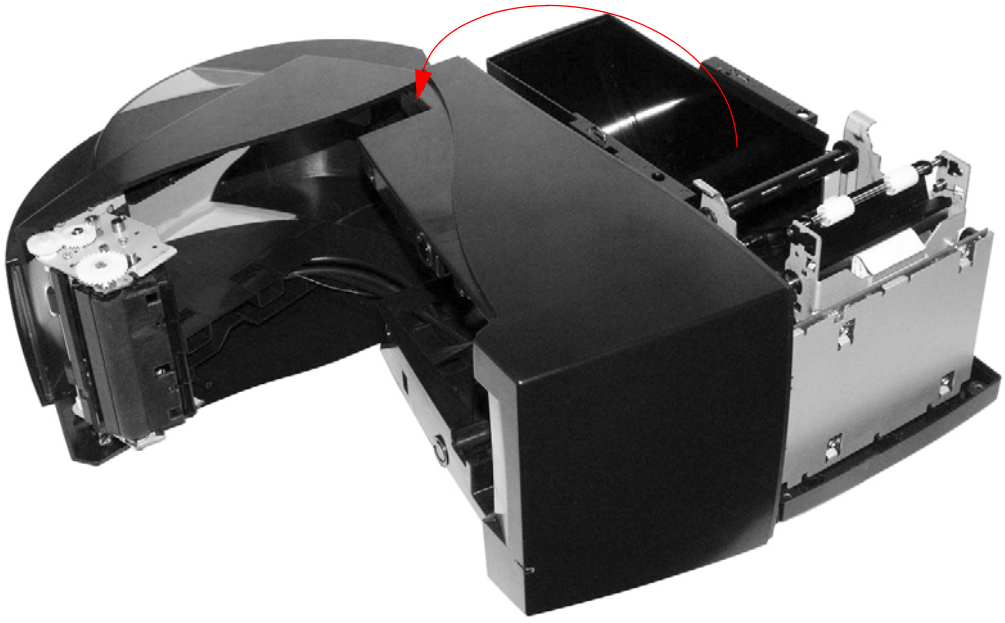


Figure 7-5. Separate Midframe/Cover from Base Assembly

5. Unplug the Top of Form Harness Assembly, Anti-Jam Sensor Harness Assembly, Stacker-Motor Harness Assembly, and Power Supply Connector from the Main Controller PCB Assembly.
6. Unplug the Ground Wire from the Printer Mechanism.

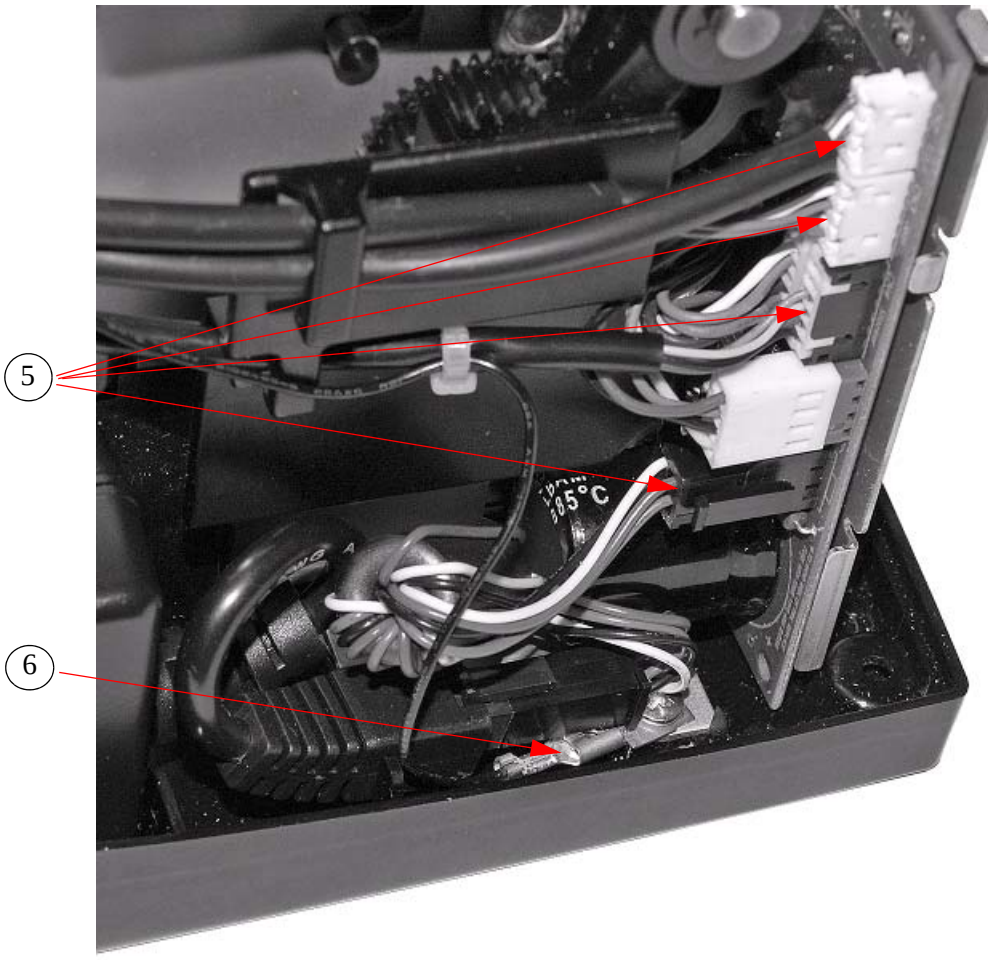


Figure 7-6. Unplug Harness Assemblies

Remove the Power Supply from the Base Assembly

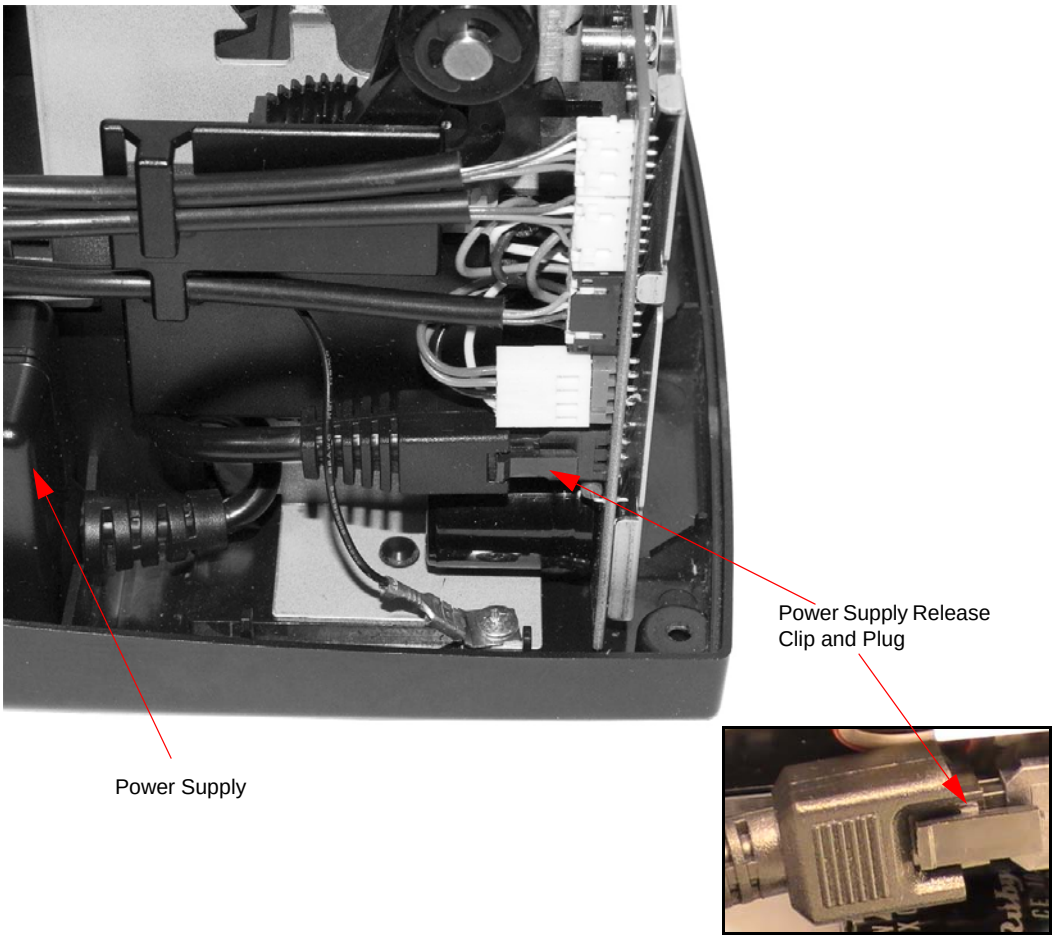


Figure 7-7. Remove Power Supply

1. Unplug the Power Supply from the Main Controller PCB Assembly. To do so, press on locking clip to release the plug from the PCB Assembly (see inset).
2. Lift the Power Supply out of the Base Assembly.

When you reinstall the Power Supply, make sure that the label faces inward; otherwise, it will not plug in correctly.

Remove the Printer Mechanism Assembly from the Base Assembly

REMEMBER TO USE ESD PRECAUTIONS

To remove the Printer Mechanism Assembly from the Base Assembly:

1. Remove four (4) #6 Thread Forming Screws holding the Printer Mechanism Assembly to the Base Assembly.
2. Rock the Printer Mechanism Assembly and then slide it forward and out from the Base Assembly. Slacker springs will separate from the bushings.

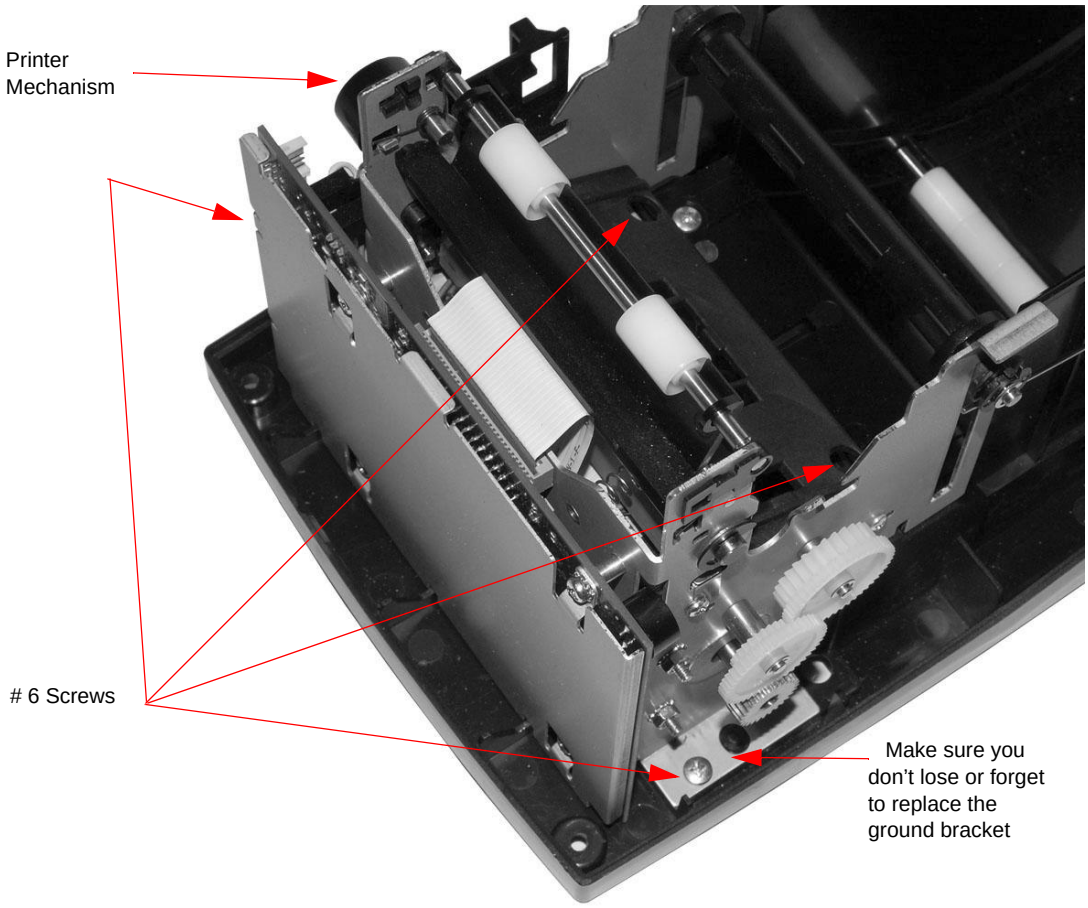


Figure 7-8. Remove Printer Mechanism Assembly from Base Assembly

Remove the Main Controller PCB Assembly from the Printer Mechanism Assembly

REMEMBER TO USE ESD PRECAUTIONS

To remove the Main Controller PCB Assembly from the Printer Mechanism Assembly:

1. Unplug all connector Harness Assemblies from the Main Controller PCB. See callouts #5 and #6 in Figure 7-6 on page 7-6.
2. Make sure that the Power Supply cable is unplugged. See Figure 7-7 on page 7.
3. Unplug the Thermal Print-head Ribbon Cable from the Main Controller PCB. See callout #2 in Figure 7-9 on page 7-10.

When reassembling the Thermal Print-head Cable make certain that the full length of the connector is seated firmly and centered in the mating connector on the Controller PCB and Thermal Print Head. Otherwise, you could cause the print head to burn out.

4. Unscrew the four (4) M3 screws (callout #3 in Figure 7-6 on page 7-6) holding the Shield-PCB and the Main Controller PCB Assembly to the Printer Mechanism Assembly.

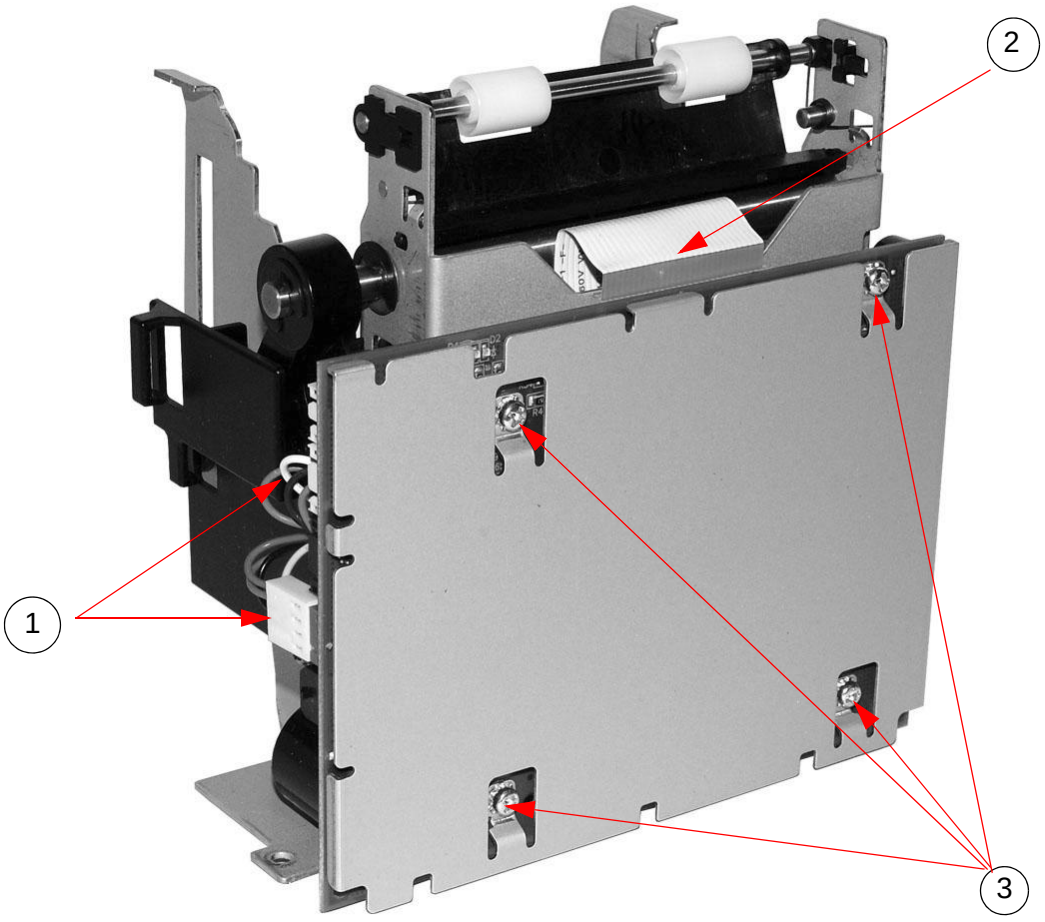


Figure 7-9. Removing Main Controller PCB Assembly from Printer Mechanism Assembly

Remove the Print Head Assembly from the Printer Mechanism Assembly (Lower Print Mechanism)

REMEMBER TO USE ESD PRECAUTIONS

To remove the Print Head Assembly from the Printer Mechanism Assembly:

1. Rotate the Knife Stepper motor gear train until the Rotary Knife Blade is parallel to the bottom of the Printer Mechanism Assembly (Home position).
2. Orient the Printer Mechanism Assembly so that the Print-head Assembly faces you as shown in Figure 7-10 on page 12.
3. Push on the Print Head Assembly until the upper set of alignment pins escape from the alignment slots in the Paper Path Assembly.
4. Push down on the Print Head Assembly, and then rock the Print Head Assembly toward you.

   You should now be able to easily remove the Print Head Assembly.

When removing the Print Head assembly, be careful not to lose the small tension spring behind it.

When reinstalling, make certain that the Rotary Knife Blade is parallel to the bottom of the Printer Mechanism Assembly (Home Position), or you may do damage to the blade, or the printer may fail to restart without running it through a power cycle.

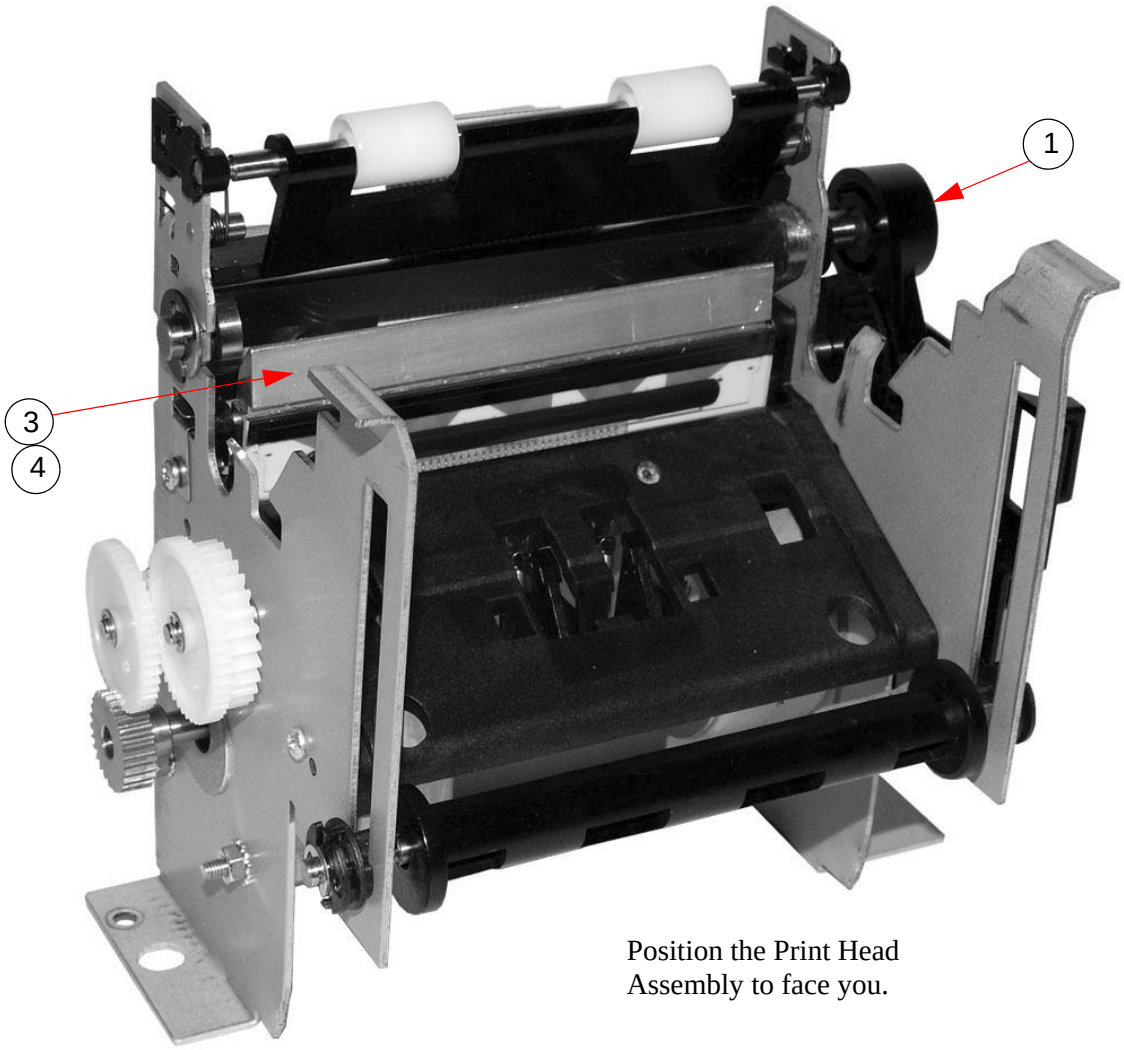


Figure 7-10. Remove Print Head Assembly from Printer Mechanism Assembly

Remove the Rotary Knife from the Printer Mechanism Assembly (Lower Print Mechanism)

REMEMBER TO USE ESD PRECAUTIONS

To remove the Rotary Knife from the Printer Mechanism Assembly:

1. Rotate the Knife Arm forward until it clears the Gear Cover.
2. Remove the outside E-Clip, allowing you to pull the arm off the shaft.
3. Remove the left and right E-Clips from the Rotative Blade.
4. Remove the left and right bushings.
5. Press the Print Head in and down to provide access for the rotary knife blade removal.

   Now you should be able to remove the rotary knife blade.

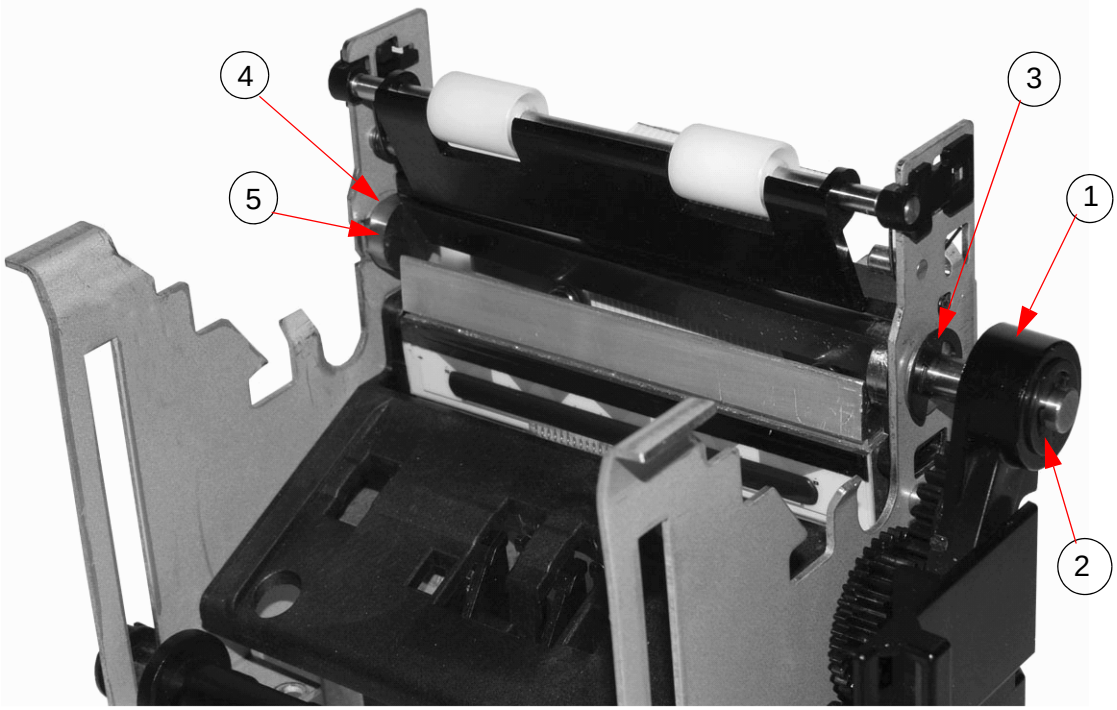


Figure 7-11. Remove Rotary Knife from Printer Mechanism Assembly

Remove Paper Path Assembly from Printer Mechanism

REMEMBER TO USE ESD PRECAUTIONS

1. Unplug Print Head cable from the PCB.

When reassembling the Thermal Print Head Cable ensure the cable is centered in the mating connector on the PCB.

2. Remove the Print Head Assembly as shown in the section “Remove the Print Head Assembly from the Printer Mechanism Assembly (Lower Print Mechanism)” on page 7-11.

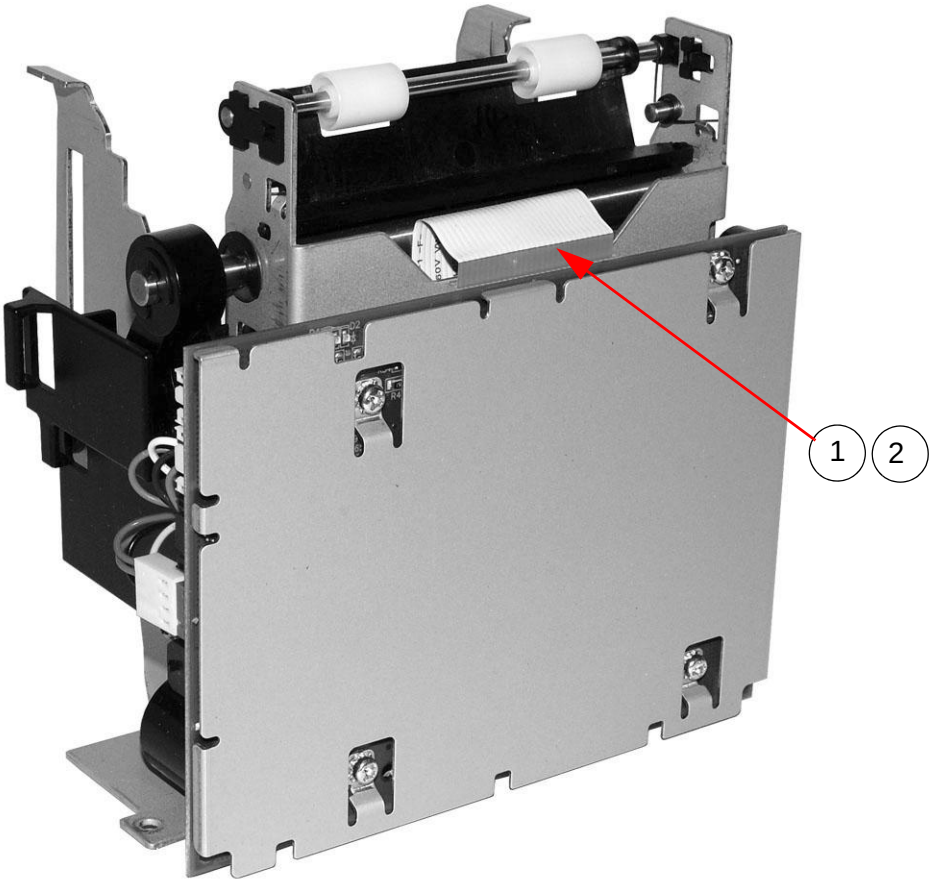


Figure 7-12. Remove Print Head Cable and Print Head Assembly

3. Remove the two (2) #4 Thread forming Screws.
4. Remove the Print Head Ground.

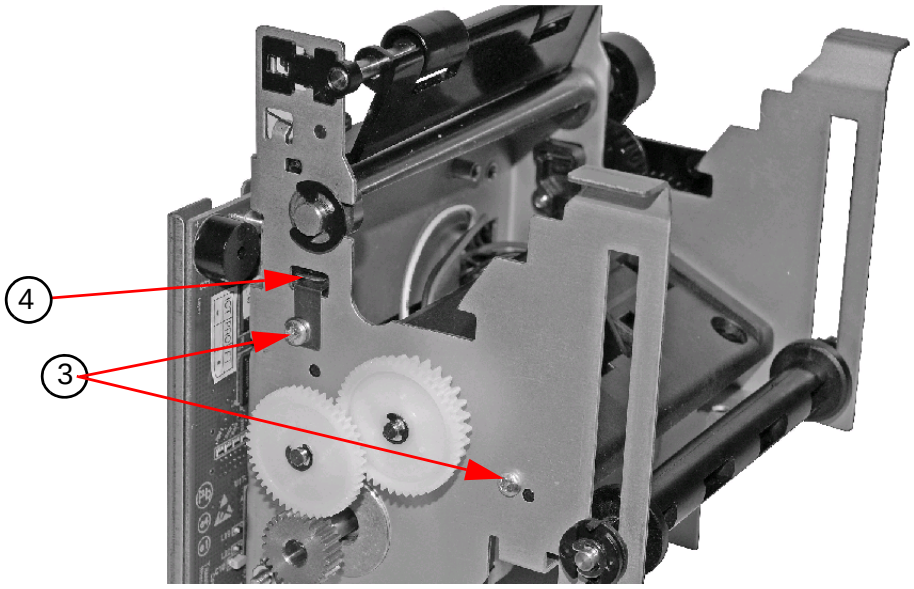


Figure 7-13. Remove 2 Thread Forming screws and Print Head Ground

5. Unplug connectors.
6. Remove two (2) M3 screws holding PCB Shield/Knife Motor to frame. (Optional - Replace one (1) M3 screw to hold the Motor in position for remaining disassembly).

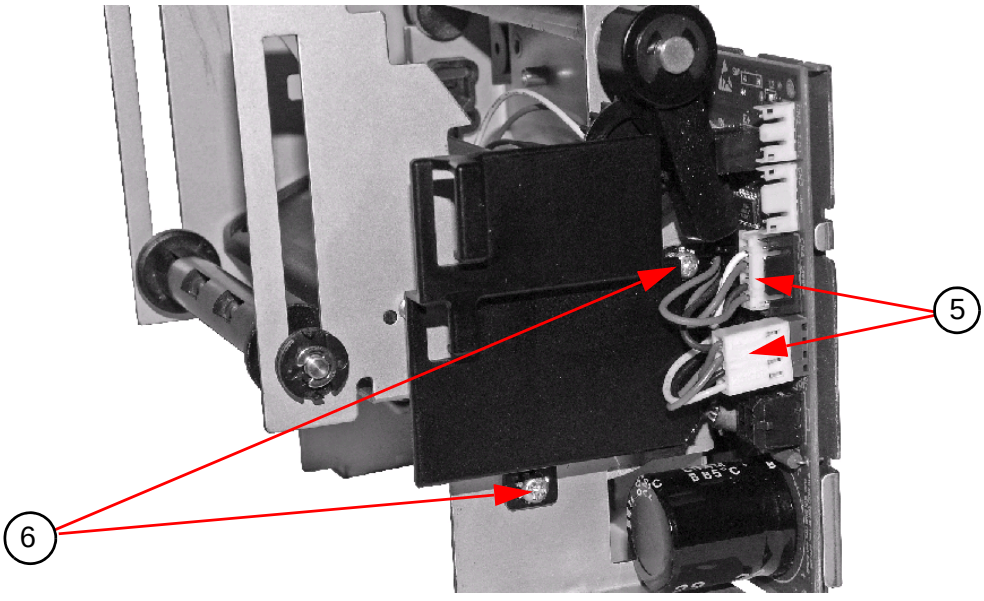


Figure 7-14. Unplug Connectors and Remove Two (2) M3 Screws

7. Remove E-Clip.
8. Remove Knife Arm.
9. Remove Rotative Blade Pin.
10. Remove three (3) Gears.

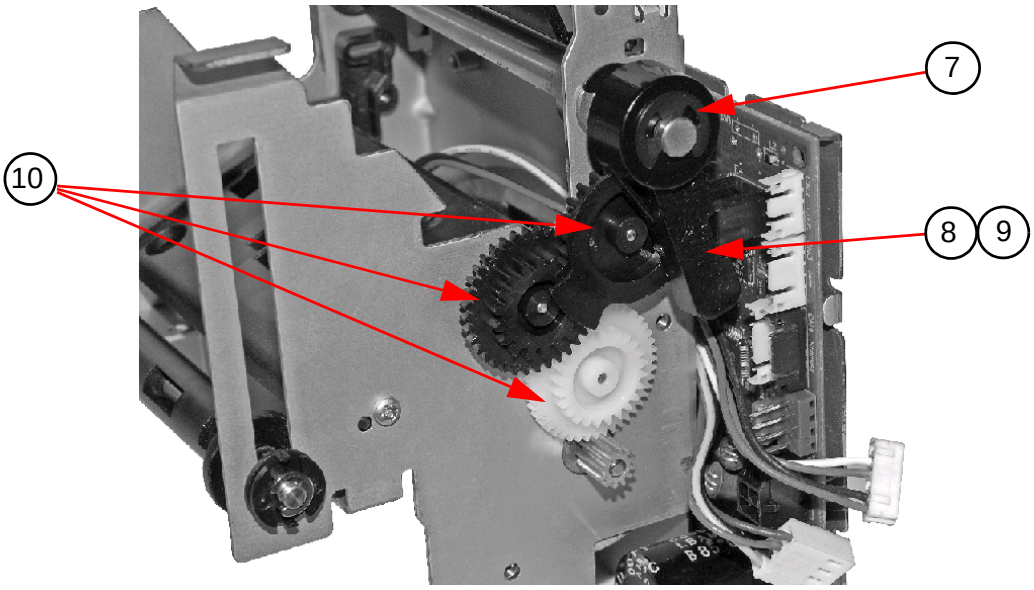


Figure 7-15. Remove E-Clip, Knife Arm, Rotative Blade Pin and Three (3) Gears

11. Remove Two (2) #4 Thread Forming Screws.
12. Remove Print Head Ground.

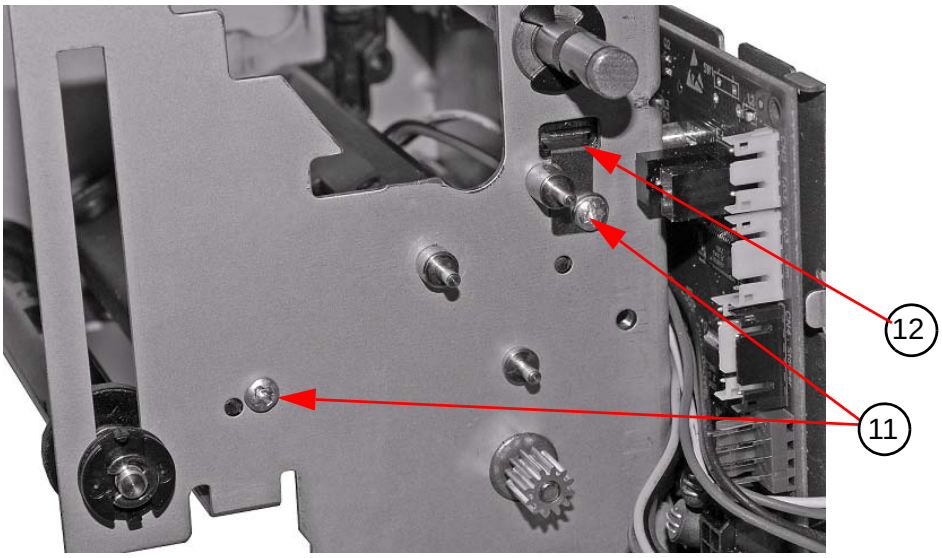


Figure 7-16. Remove Two (2) #4 Thread Forming Screws and Print Head Ground

13. Remove Paper Path Assembly from Frame being careful not to damage sensor flags.

Reassemble by reversing the previous steps, taking care that the locating bosses are aligned with the mating holes in the frame.

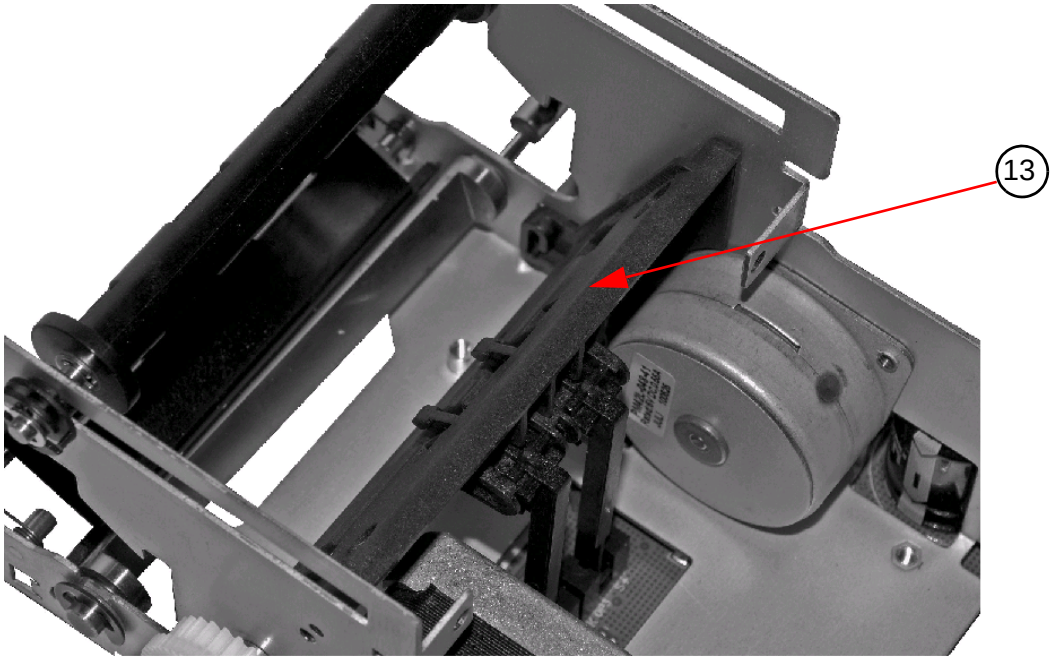


Figure 7-17. Remove Paper Path Assembly from Frame

When reassembling the Thermal Print Head Cable ensure the cable is centered in the mating connector on the PCB.

Remove Stacker Guide Assembly from the Printer Mechanism Assembly

REMEMBER TO USE ESD PRECAUTIONS

1. Unhook Left/Right Validation Compensation Springs and remove springs.

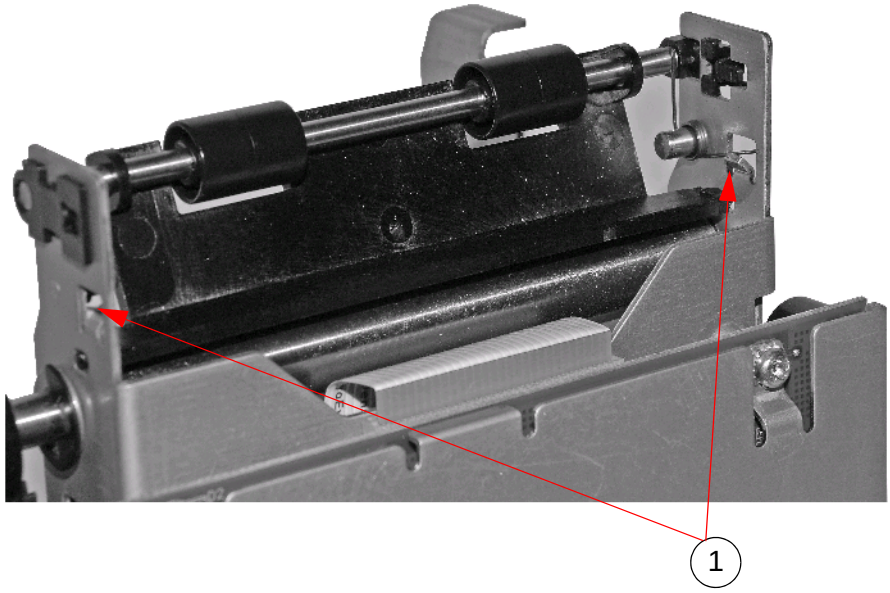


Figure 7-18. Unhook Validation Springs and Remove.

2. Slide Stacker Shaft to the right to remove.
3. Remove two (2) Transport Rollers.

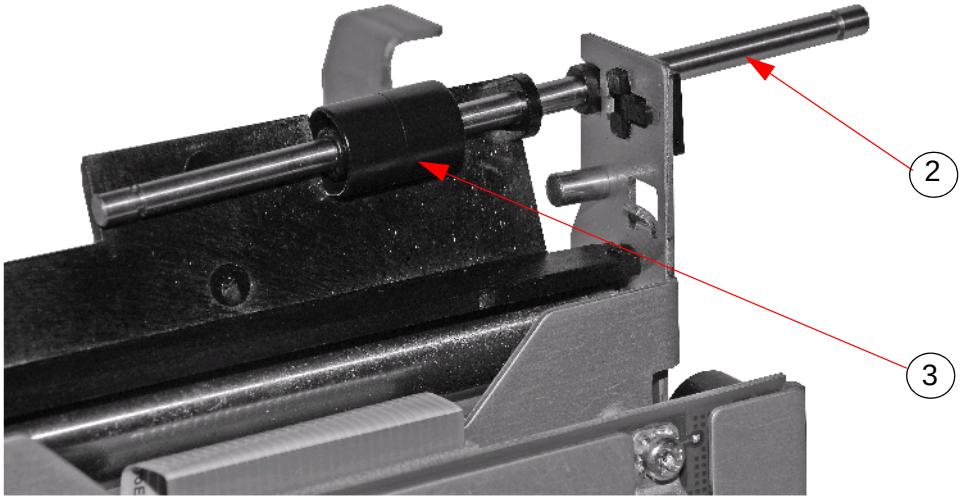
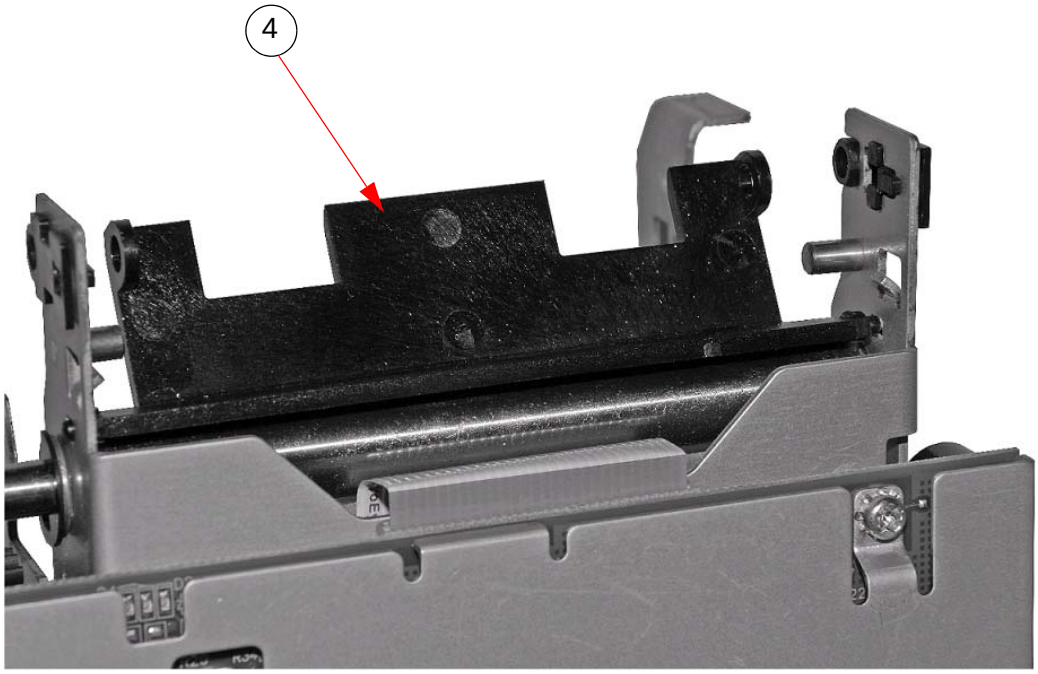


Figure 7-19. Slide Stacker Shaft to Right and Remove, then Remove Two Transport Rollers

4. Remove Stacker Guide from Frame being careful not to bend the frame tabs.

Reassemble reversing the above steps. Ensure the Compensation Bearings, the shaft and rollers move freely in the frame.



Remove Platen from the Knife/Stacker Assembly

REMEMBER TO USE ESD PRECAUTIONS

To remove the platen from the knife/stacker assembly:

1. Remove the Platen Gear.
2. Loosen #4 thread forming screw - typ left/right sides.
3. Remove #4 thread forming screw - typ left/right sides.
4. Remove Bearing Retainer - typ left/right sides.
5. Slide Platen, Stripper, and L/R bearings forward to remove from side plates.

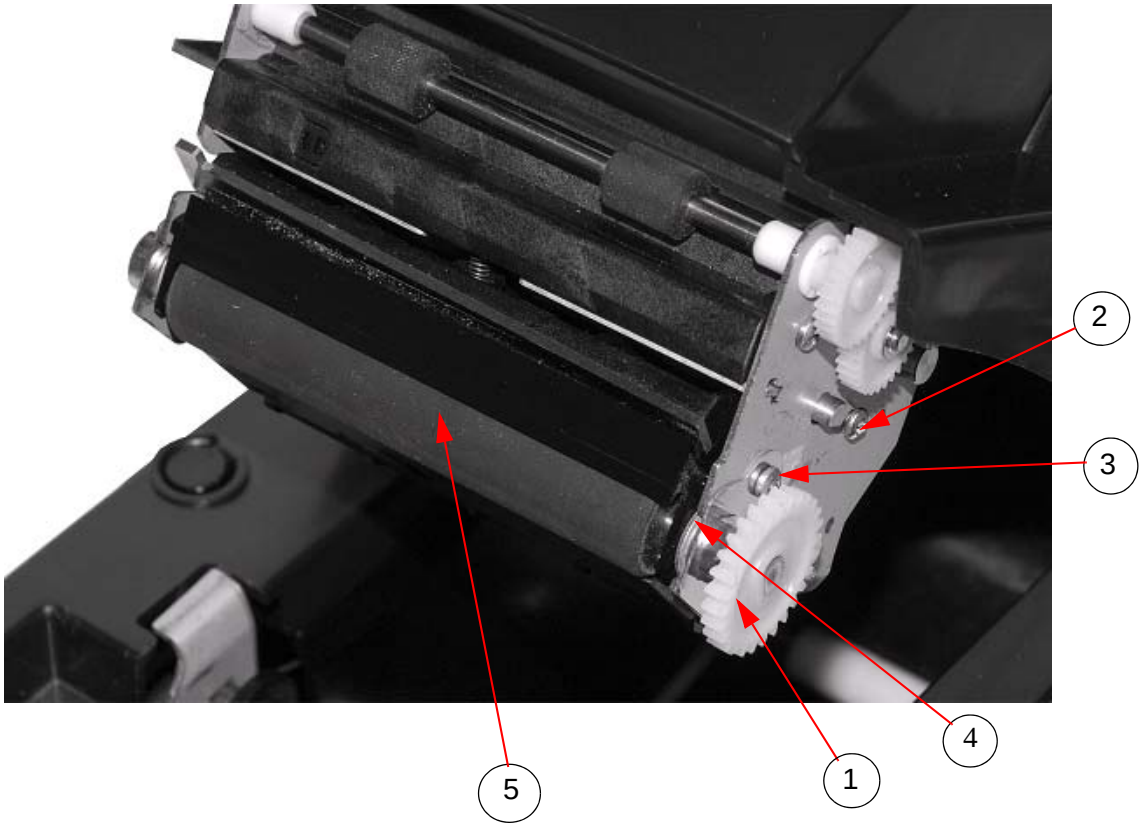


Figure 7-20. Remove Platen from Knife/Stacker Assembly

When installing Platen, Stripper, and Bearings ensure the Stripper locating bosses are aligned with mating holes in the L/R Side Plates and then tighten screws. Platen should spin freely when assembly is completed.

Remove Fixed Blade from the Knife/Stacker Assembly

REMEMBER TO USE ESD PRECAUTIONS

To remove the fixed blade from the Knife/Stacker Assembly:

1. Remove (6) #6 thread forming screws retaining knife/stacker assembly to the cover.

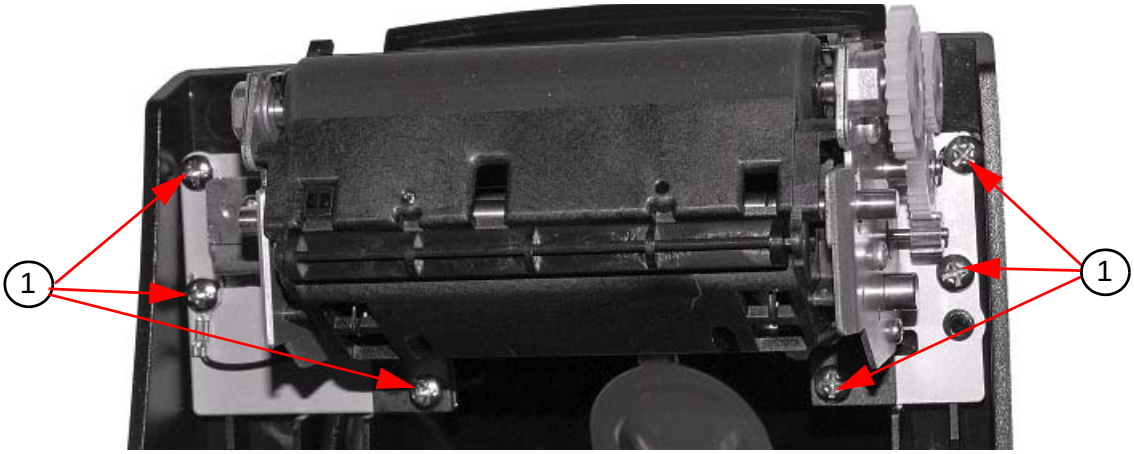


Figure 7-21. Remove #6 Screws

2. Remove knife/stacker assembly from the paper cover. Remove wire harnesses from the wire retention features in the cover.

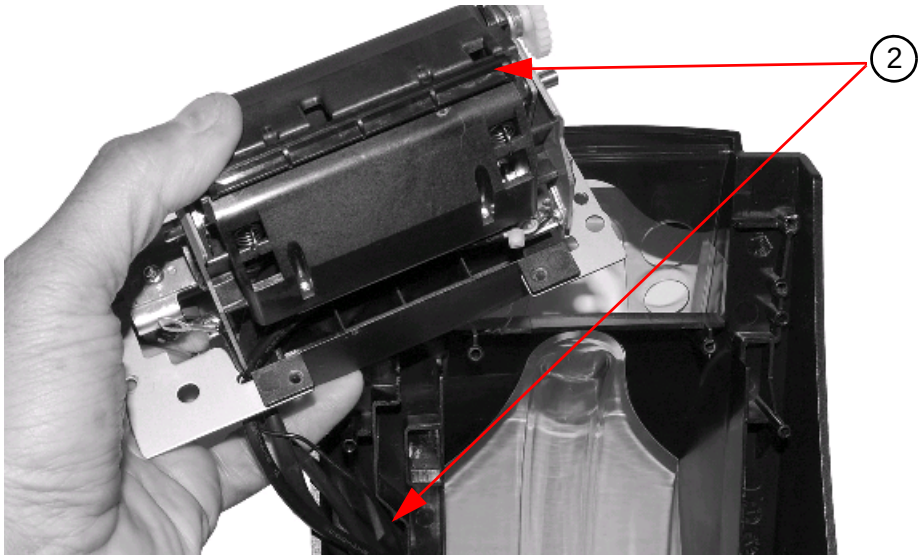


Figure 7-22. Remove Knife/Stacker Assembly from Paper Cover

3. Remove Stacking Gear
4. Remove Stacking Gear/Retaining Ring.
5. Remove Platen Gear.

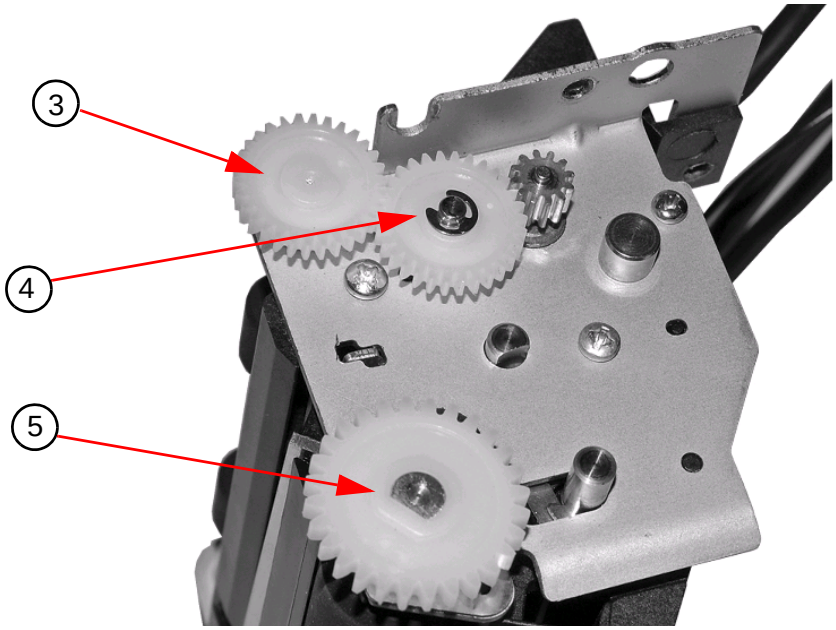


Figure 7-23. Remove Stacking Gear, Retaining Ring and Platen Gear

6. Remove one (1) #4 Thread Forming Screw.
7. Remove the Right Platen Bearing Retainer.

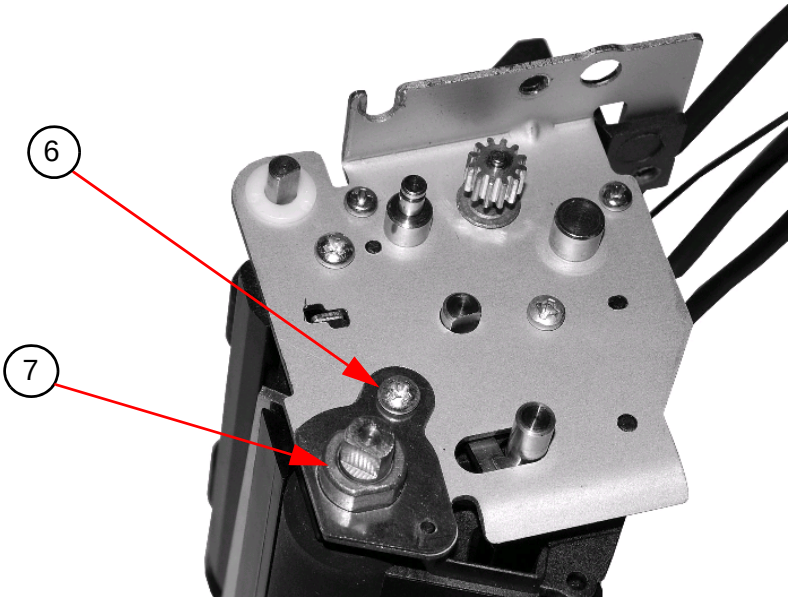


Figure 7-24. Remove Screw and Right Platen Bearing Retainer

8. Remove one (1) #4 Thread Forming Screw.
9. Remove the Left Platen Bearing Retainer.

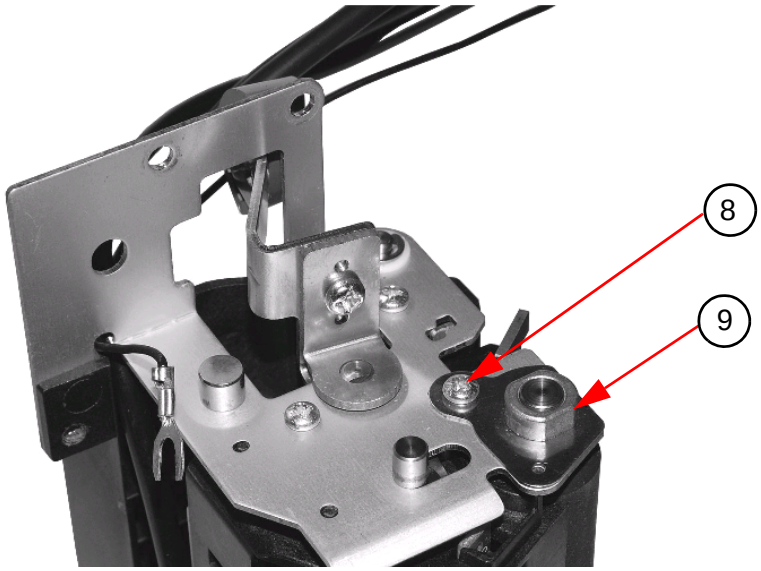


Figure 7-25. Remove #4 Screw and Left Platen Retainer

10. Remove Stacker Bearing.
11. Remove two (2) #4 Thread Forming screws.

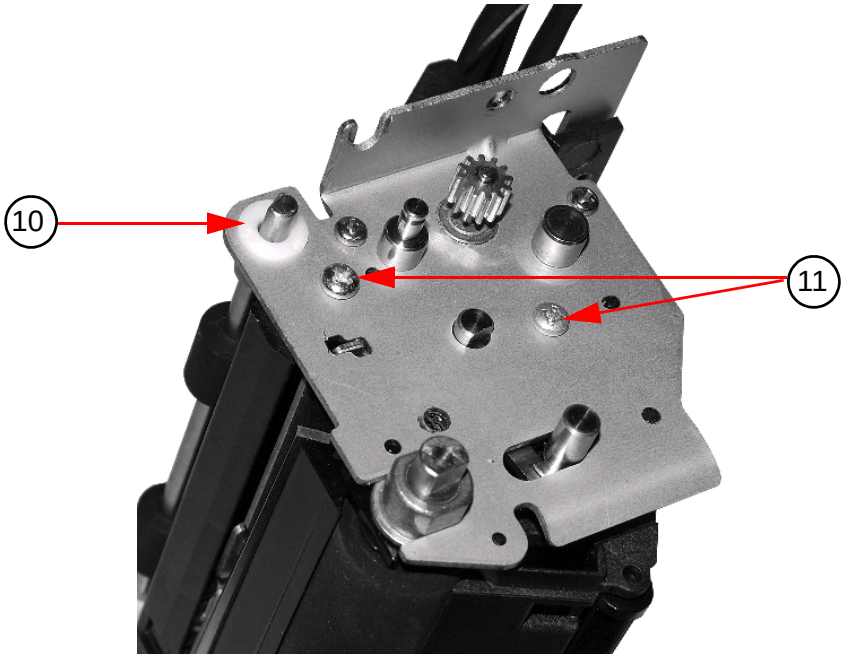


Figure 7-26. Remove Stacker Bearing and Two (2) #4 Screws

12. Remove Right Side Plate Assembly.
13. Remove Platen, Stripper, and L/R Platen Bearings.

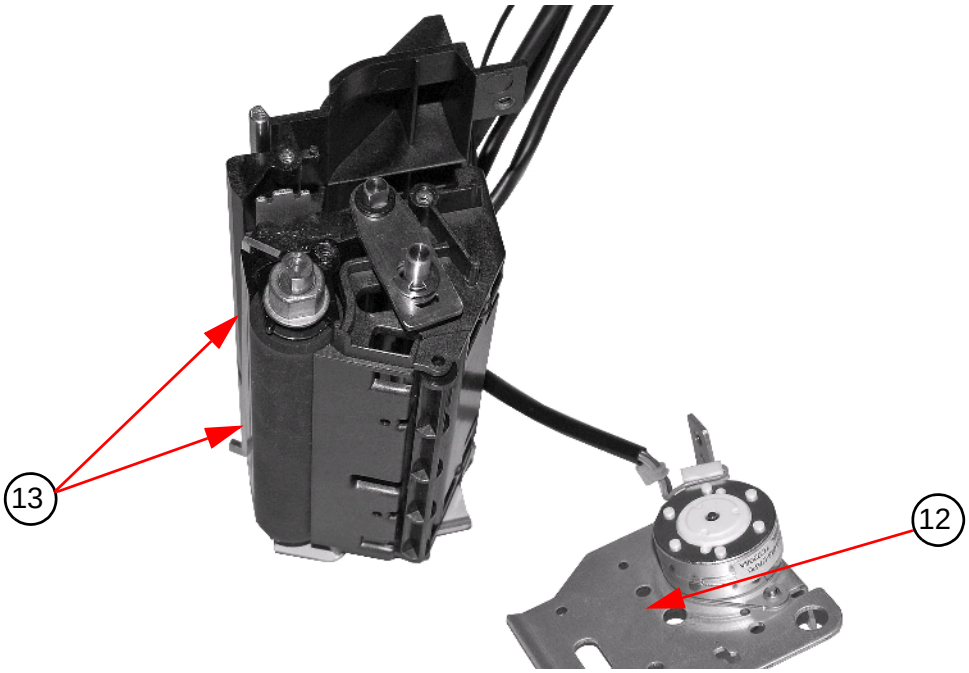


Figure 7-27. Remove Right Side Plate Assy, Platen, Stripper, and L/R Platen Bearings

14. Remove Fixed Blade Spring.

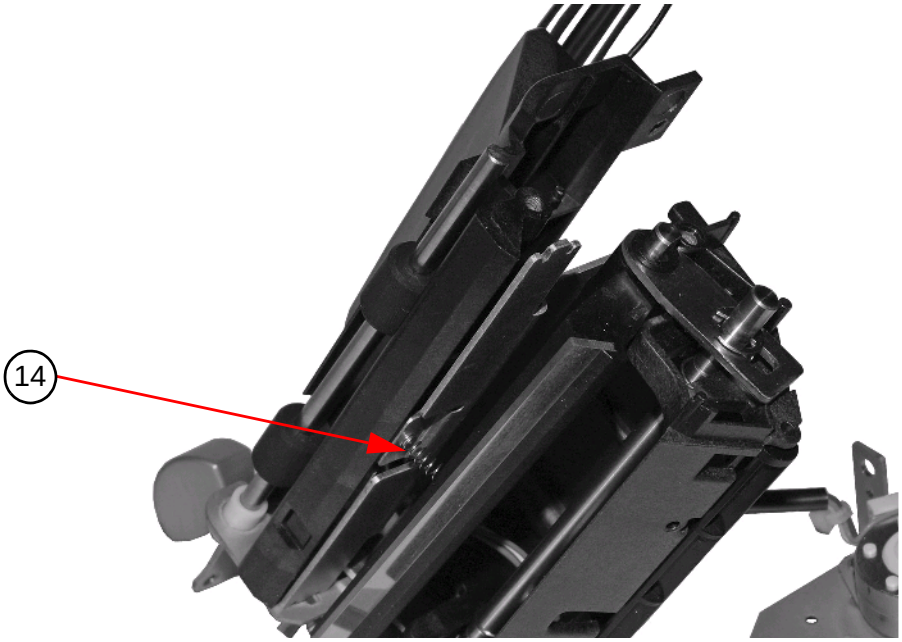


Figure 7-28. Remove Fixed Blade Spring

15. Remove Latch Arm Hub.
16. Remove Retaining Ring.

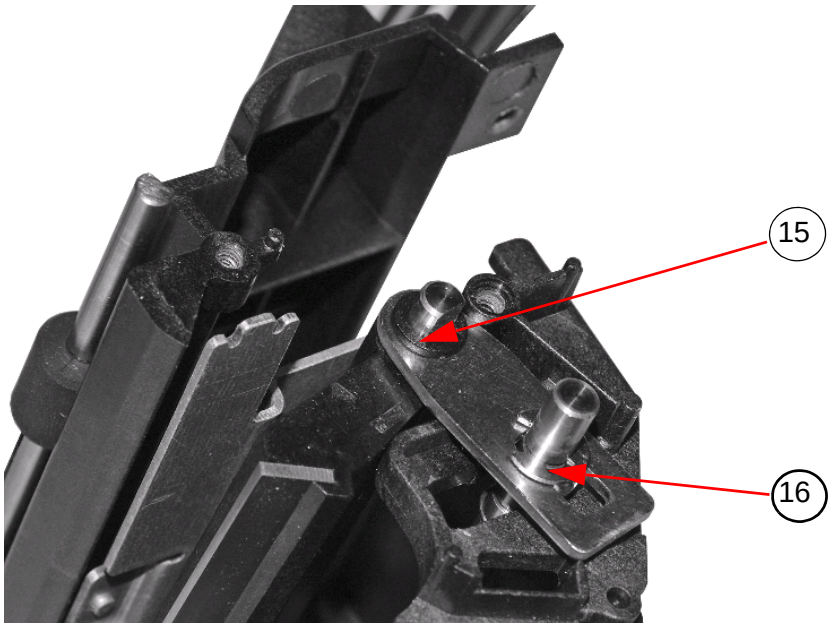


Figure 7-29. Remove Latch Arm Hub and Retaining Ring

Position remaining assembly in a vertical orientation for remaining disassembly.

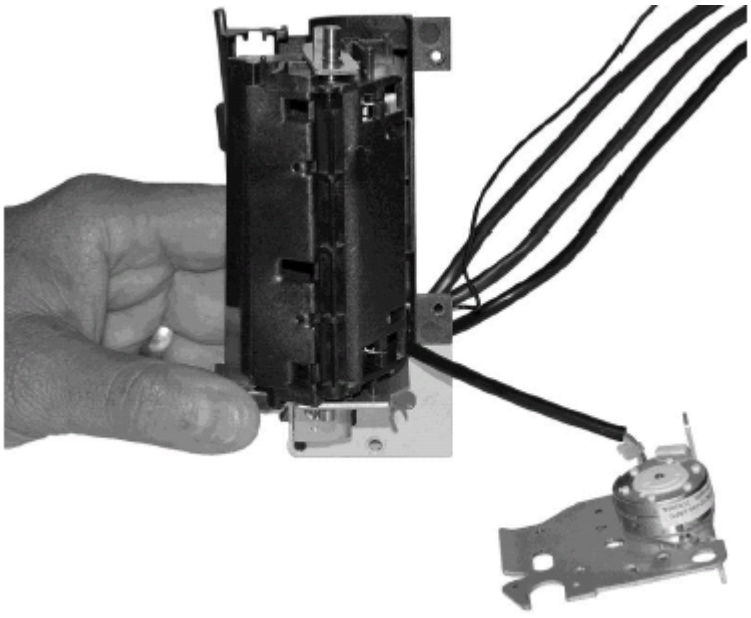


Figure 7-30. Position Remaining Assembly Vertically

17. Remove Knife Pivot Shaft.
18. Remove Latch Arm Pivot
19. Remove Fixed Blade Assembly.

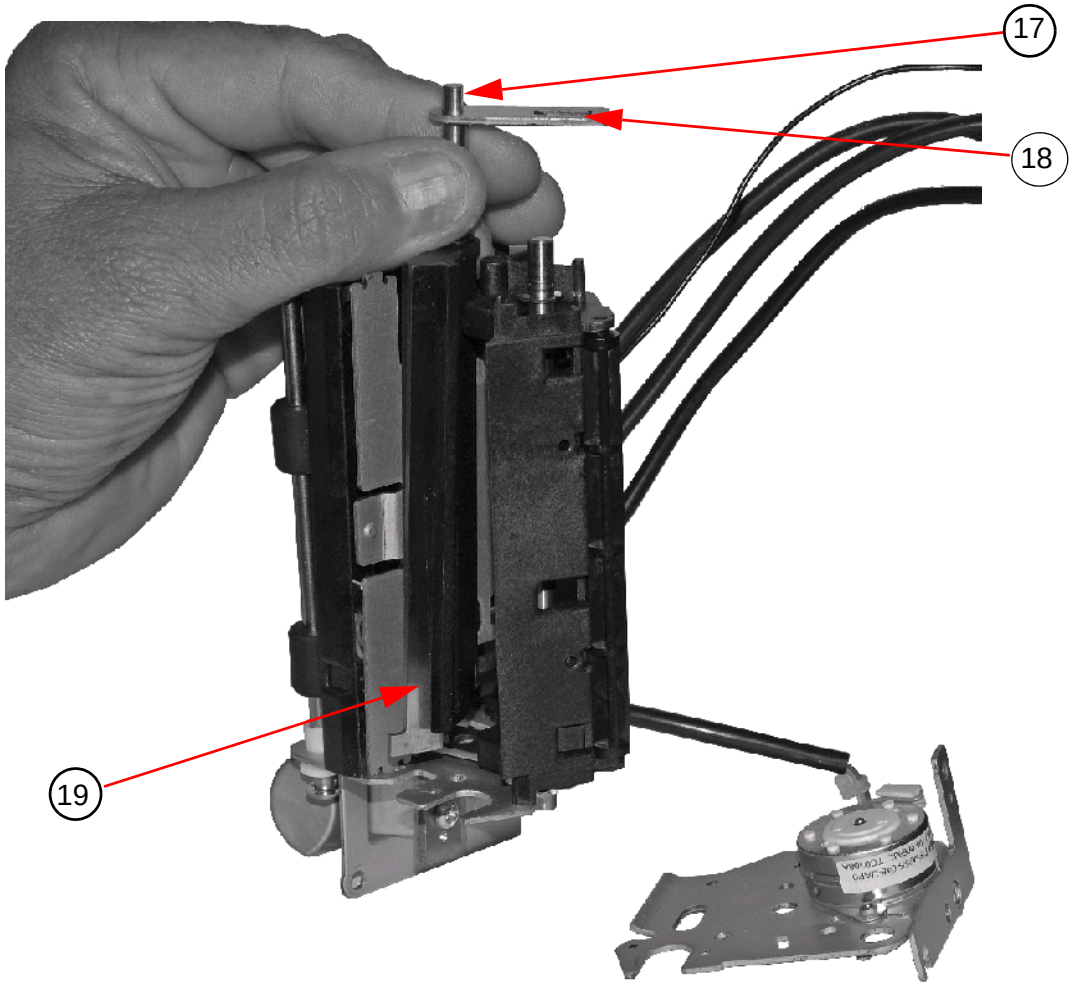


Figure 7-31. Remove Knife Pivot Shaft, Latch Arm Pivot, and Fixed Blade Assy

20. Ensure Latch Arm Hub is in proper location for reassembly.

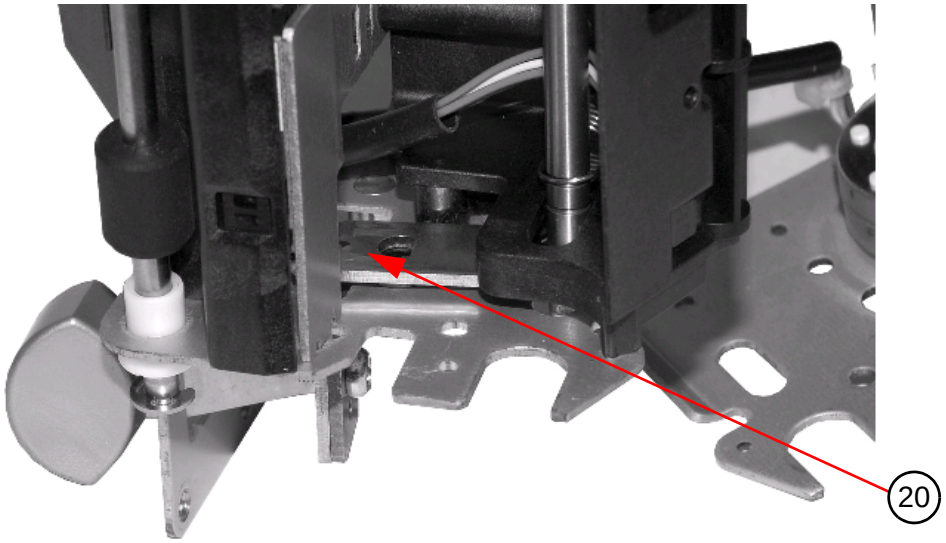


Figure 7-32. Check Location of Latch Arm Hub

Reverse Steps 1 through 20 for reassembly.

When installing Platen, Striper, and Bearings, ensure the Striper locating bosses are aligned with the mating holes in the Left and Right Side Plates, and then tighten screws. Platen should spin freely when assembly is complete.

8

Troubleshooting

Introduction to Troubleshooting

These steps are a general guideline for Field Service Technicians to follow in the event of a specific fault. After each step, the printer should be checked to determine whether or not the step cleared the fault. If the fault is not cleared with the first step, the next step is performed in an attempt to clear the fault on the printer. If the fault cannot be cleared, the printer should be sent for repair.

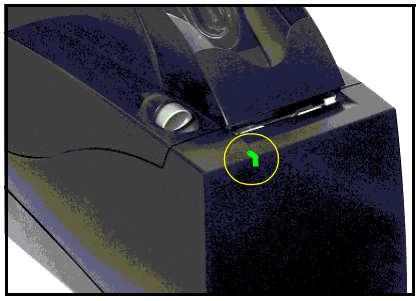
Prior to performing any of the FST or RLT steps that follow, ensure that the printer's warranty status has been determined. If a printer is still In-Warranty, you may only perform cleaning procedures in an attempt to clear a fault, disassembly procedures are not allowed. Any hard failures must be sent to the OEM for repair.

These steps are a general guideline for RLT's to follow in the event of a specific fault. After each step, the printer should be checked to determine whether or not the step cleared the fault. If the fault is not cleared with the first step, the next step is performed, and so on until the fault is cleared or until the problem is further identified.

Performing the steps in this chapter may VOID the warranty and is therefore PROHIBITED until advised by Management.

Troubleshooting Steps for FST's

Problem		Action
Printing Incorrectly	**Colored stripe on the receipt**	1. Check the paper level. 2. If paper is low, change the paper. Refer to "Loading Paper" on page 3-6. 3. Clean the Top-of-Form / Paper Low sensor with 91% isopropyl alcohol and cotton swabs. See "Cleaning the Top-of-Form/ Paper Low Sensor" on page 9-3. 4. Swap the printer.
	Print is light or spotty	1. Make sure the paper is loaded correctly. Refer to "Loading Paper" on page 3-6. 2. Ensure the use of the recommended thermal receipt paper. 3. Swap the printer.
	Vertical column of print is missing	Swap the printer
	Receipt does not come all of the way out	1.Open the receipt cover and clear any jammed paper. Refer to "Clearing a Paper Jam" on page 8-10). 2. Swap the printer.
	Printer starts to print, but stops while the receipt is being printed	1.Open the receipt cover and clear any jammed paper. Refer to "Clearing a Paper Jam" on page 8-10). 2. Swap the printer.
	Receipt is not cut	1. Open the receipt cover and clear any jammed paper. Refer to "Clearing a Paper Jam" on page 8-10). 2. Swap the printer.
	One side of receipt is missing	Swap the printer.

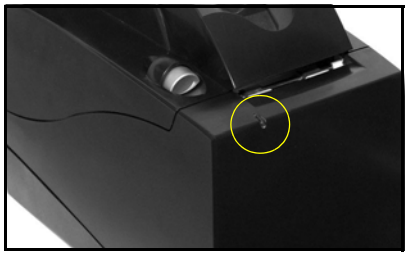
<table>
<tr><th colspan="2">Problem</th><th>Action</th></tr>
<tr><td>Printer Is Not Working</td><td>No Power</td><td>1. Check that the terminal has power.
2. Check that printer cables are properly connected on both ends.
3. Ensure the latch and receipt cover is closed.
4. Verify the printer configuration and re-configure if necessary.
5. Ensure that the printer is being operated in the proper room temperature (not too hot or too cold). If necessary, move the printer to a warmer/ cooler location.
6. Swap the Power Supply. Refer to “Remove the Power Supply from the Base Assembly” on page 8-7.
7. Swap the printer.</td></tr>
<tr><td>Printer Status LED is blinking</td><td colspan="2"> 
During Normal operation, the Power LED remains on unless an error is indicated. There are two classes of errors: soft and hard. Soft errors are recoverable without power cycling the printer. Hard errors cannot be recovered from without removing power from the printer, correcting the problem, and then reapplying power.
Error Indicators:
• Power—Green
• Error—Red
• Paper - Yellow

Note: When the Indicators for Error and Paper are both illuminated an Orange/Amber color displays.</td></tr>
<tr><td></td><td colspan="2">Soft Errors: Soft errors may be recovered by the host or by opening and closing the printer cover. The following soft errors are indicated by a 5 second repeating blink pattern. Refer to “Soft Errors” on page 5-4 for specific error information.</td></tr>
<tr><td></td><td>Out of Paper</td><td>1. Change the paper. Refer to “Loading Paper” on page 3-6.
2. Swap the printer.</td></tr>
<tr><td></td><td>Paper Low Error</td><td>1. Change the paper. Refer to “Loading Paper” on page 3-6.
2. Swap the printer.</td></tr>
</table>

Problem		Action
Printer Status LED is blinking (contin.)	**Cover Open**	1. Close the printer cover securely. 2. Swap the printer.
	Jam Detected	1.Open the receipt cover and clear any jammed paper. Refer to “Clearing a Paper Jam” on page 8-10. 2. Swap the printer.
	Missed Top of Form (TOF)	1. Clean top-of-form sensor with 91% isopropyl alcohol and cotton swabs. 2. Swap the printer.
	Invalid Command	1. Turn the printer off, wait 60 seconds, then turn it on again. 2. Swap the printer.
	Printer Head Over Temperature	1. Ensure that the printer is being operated in the proper room temperature (not too hot or too cold). 2. If necessary, move the printer to a warmer/ cooler location. 3. Swap the printer.
	Power Problem	1. Turn the printer off, wait 60 seconds, then turn it on again. 2. Swap the printer.
	Hard Errors: Hard errors have a similar pattern to Soft errors only they are slower and repeat every 10 seconds. In general they occur during level 0 diagnostics and are not recoverable. In all cases of Hard Errors, swap the printer.	

Troubleshooting Steps for RLT's

Problem		Action
Printing Incorrectly	**Colored stripe on the receipt**	1. Check the paper level. 2. If paper is low, change the paper. Refer to "Loading Paper" on page 8-8. 3. Clean the Top-of-Form / Paper Low sensor with 91% isopropyl alcohol and cotton swabs.
	Print is light or spotty	1. Make sure the paper is loaded correctly. Refer to "Loading Paper" on page 8-8. 2. Ensure the use of the recommended thermal receipt paper. 3. Clean thermal print head with 91% isopropyl alcohol and cotton swabs. 4. Check thermal print head cable connections. 5'. Replace the printer mechanism. Refer to "Remove the Printer Mechanism Assembly from the Base Assembly" on page 7-8.
	Missing Print	Replace the print head. Refer to "Remove the Print Head Assembly from the Printer Mechanism Assembly (Lower Print Mechanism)" on page 7-11.
	Vertical column of print is missing	Replace the print head. Refer to "Remove the Print Head Assembly from the Printer Mechanism Assembly (Lower Print Mechanism)" on page 7-11.
	Receipt does not come all of the way out	Open the receipt cover and clear any jammed paper. Refer to "Clearing a Paper Jam" on page 8-10.
	Printer starts to print, but stops while the receipt is being printed	Open the receipt cover and clear any jammed paper. Refer to "Clearing a Paper Jam" on page 8-10.

Problem		Action
Printing Incorrectly (contin.)	**Receipt is not cut**	1. Open the receipt cover and clear any jammed paper. Refer to “Clearing a Paper Jam” on page 8-10. 2. Check the connections to the Main Controller PCB. 3. Replace the Main Controller PCB Assembly. 4. Replace the printer mechanism. Refer to “Remove the Printer Mechanism Assembly from the Base Assembly” on page 7-8.
Sensors are not working properly		1. Open the printer. 2. Remove the printer cover. 3. Clean the optical sensors (Paper Out, Top-of-Form/Paper Low, Anti-Jam, and Paper Cover Opened) with isopropyl alcohol and cotton swabs.
Printer Errors LED is blinking **Error Indicators**: Power -> Green Error -> Red Paper -> Yellow	**Soft & Hard Errors:** **Soft Errors:** Soft errors may be recovered by the host or by opening and closing the printer cover. All of these errors are indicated by a 5 second repeating blink pattern. Refer to “Soft Errors” on page 5-4 for specific error information. 	
	Out of Paper	1. Change the paper. Refer to “Loading Paper” on page 8-8. 2. Clean all sensors with 91% isopropyl alcohol and cotton swabs. 3. Replace the Main Controller PCB Assembly.
	Paper Low Error	1. Change the paper. Refer to “Loading Paper” on page 8-8. 2. Clean all sensors with 91% isopropyl alcohol and cotton swabs. 3. Replace the Main Controller PCB Assembly.
	Cover Open	1. Close the printer cover securely. 2. Clean all sensors with 91% isopropyl alcohol and cotton swabs. 3. Replace the Main Controller PCB Assembly.

Problem		Action
Printer Status LED is blinking (contin.)	**Missed Top of Form**	1. Clean all sensors with 91% isopropyl alcohol and cotton swabs. 2. Replace the Main Controller PCB Assembly.
	Jam Detected	1.Open the receipt cover and clear any jammed paper. Refer to “Clearing a Paper Jam” on page 8-10. 2. Clean all sensors with 91% isopropyl alcohol and cotton swabs. 3. Replace the Main Controller PCB Assembly.
	Invalid Command	1. Turn the printer off and then on again. 2. Reload firmware.
	Printer Head Over Temperature	1. Ensure that the printer is being operated in the proper room temperature (not too hot or too cold). 2. If necessary, move the printer to a warmer/ cooler location. 3. Replace the Main Controller PCB Assembly.
	Power Problem	1. Check that the terminal has power. 2. Check that printer cables are properly connected on both ends. 3. Ensure the latch and receipt cover is closed. 4. Verify the printer configuration and re-configure if necessary. 5. Ensure that the printer is being operated in the proper room temperature (not too hot or too cold). If necessary, move the printer to a warmer/ cooler location. 6. Swap the Power Supply. Refer to “Remove the Power Supply from the Base Assembly” on page 7-7. 7. Swap the printer.

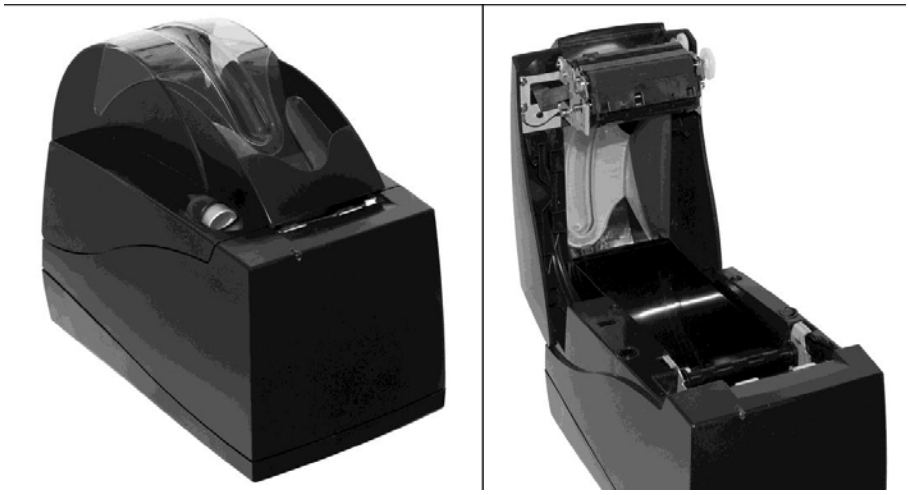
Hard Errors:
Hard Errors have a similar pattern to Soft errors only they are slower and repeat every 10 seconds. In general they occur during level 0 diagnostics and are not recoverable. Refer to “Hard Errors” on page 5-5 for specific error information.

In all cases of Hard Errors, replace the printer mechanism. See “Remove the Printer Mechanism Assembly from the Base Assembly” on page 7-8.

Loading Paper

Follow the instructions below to load a new roll of paper into the Accutherm® Ultra printer. Reference the photos that follow each step for the illustrated procedure.

1. Press back on the gray cover latch button and raise the paper cover to the open position.



2. Tear off the first layer of the paper roll. Place the paper roll into the printer, so that the paper unwinds from the bottom (front).

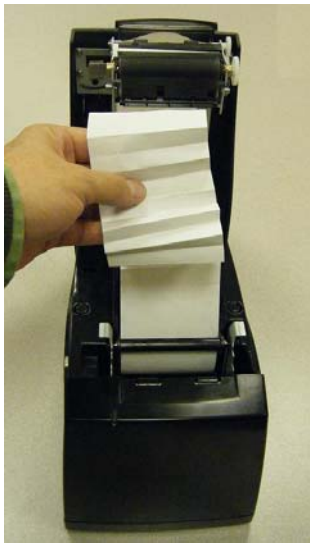
3. Leave a few inches of paper outside of the printer.

4. Close the paper cover firmly so that it latches securely. Paper will feed automatically to align itself and then the printer will automatically cut off the excess paper.

Clearing a Paper Jam

1. Press back on the cover latch button.
2. Raise the paper cover to the Open position.

3. Grasp the jammed paper and gently pull to un-jam it from the inside of the printer.
4. Advance the paper roll so that the jammed portion and a few additional inches are outside of the printer.



5. Close the paper cover firmly so that latches securely.
6. The paper will feed automatically to align itself and the printer will automatically cut off the excess paper.

9

Preventive Maintenance

General Cleaning

Be sure to follow ESD precautions when performing maintenance on the printer. This is stressed particularly when performing any cleaning of the print head, as ESD discharge directly onto the print head can cause failures.

Once the unit is opened, the paper path is accessible for cleaning or clearing paper. Use a soft brush to clean the paper dust from inside the printer. The paper dust should also be removed from the sensor optics.

Cleaning the Print Head

TO BE PERFORMED BY RLT ONLY USING ESD PRECAUTIONS

After printing, the print head can be very hot. Be careful not to touch it and let it cool down before you clean it. Do not damage the print head by touching it with your fingers or any hard object.

If streaking on the printed ticket is evident, the thermal print head may need to be cleaned (Figure 9-1). This can be with a cotton swab moistened with 91% isopropyl alcohol.

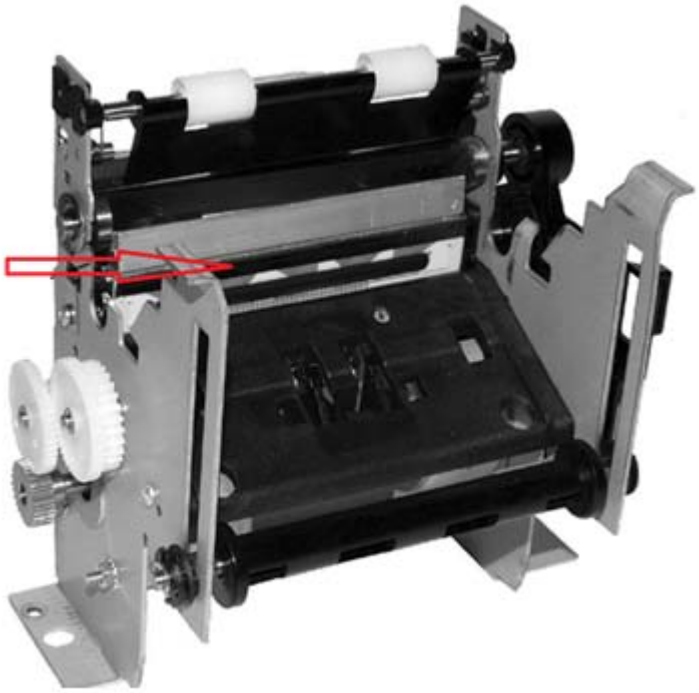


Figure 9-1. Cleaning Print Head (Use ESD Precautions)

Cleaning the Top-of-Form/ Paper Low Sensor

Clean the Top-of-Form / Paper Low sensor with a cotton swab moistened with 91% isopropyl alcohol (Figure 9-2).

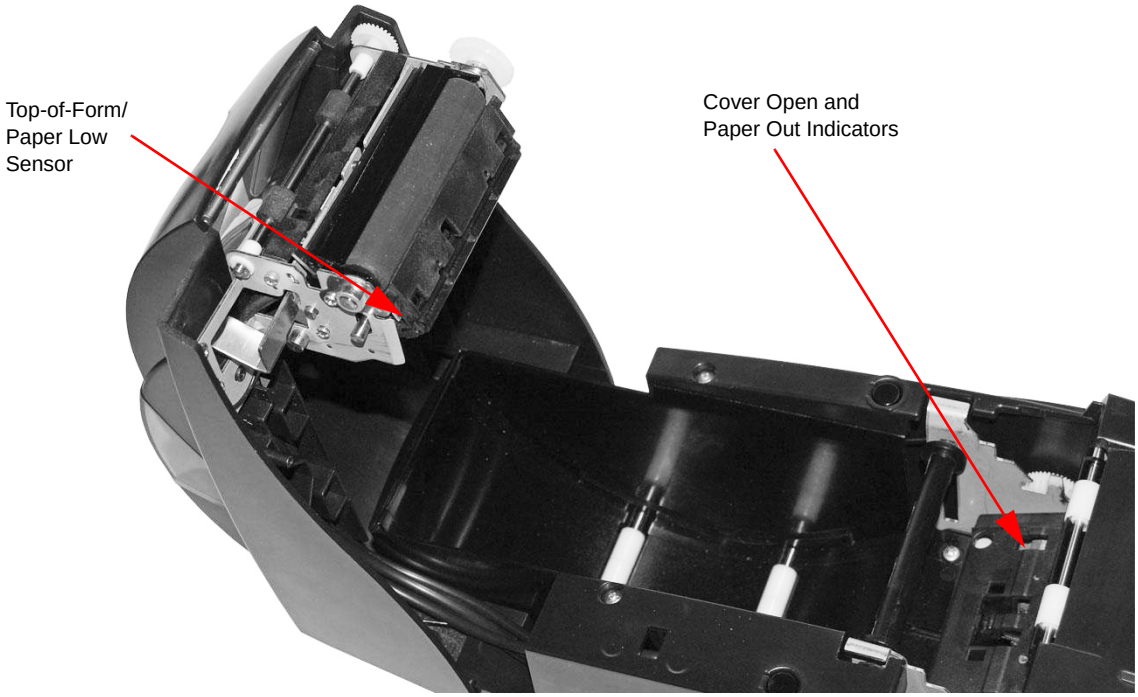


Figure 9-2. Clean TOF Sensor and Check Paper Out Indicators

Cleaning the Jam Detection Sensor

Clean the Jam Detection Sensor with a cotton swab moistened with 91% isopropyl alcohol (Figure 9-3).

Cleaning the Platen

Use a cloth **dampened** with alcohol to wipe the platen of any debris, as needed (Figure 9-3).

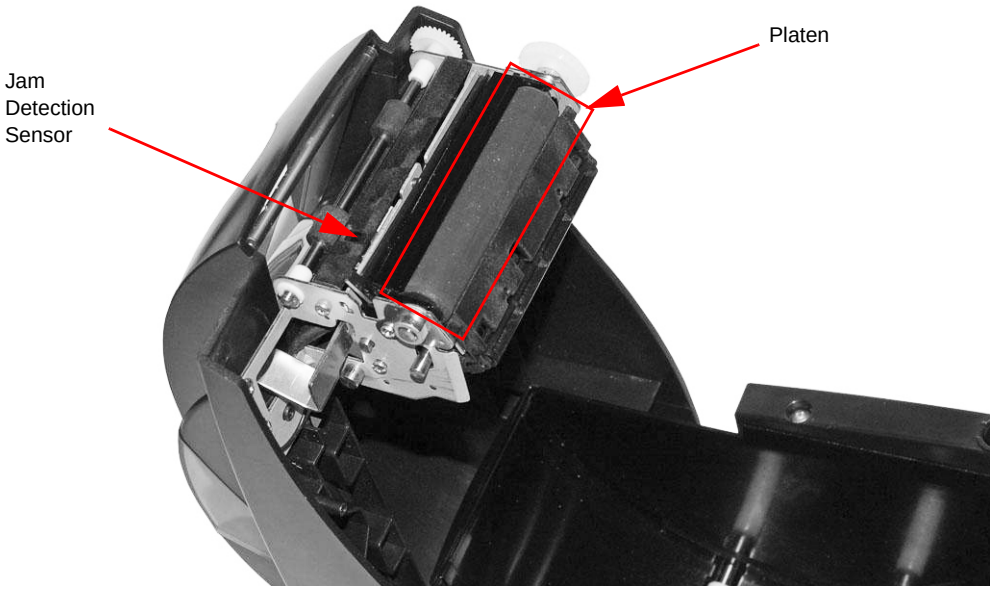


Figure 9-3. Cleaning the Jam Detection Sensor and Platen

A

Handling Precautions

This chapter explains the proper handling of Electrostatic Discharge (ESD) sensitive modules and devices, the proper transport of terminals and other parts, how terminals and devices should be packaged for returns to depots or retailers, and the proper storage of extra or backup devices and parts.

ESD HANDLING

All GTECH Printed Circuit Boards (PCBs) are static-sensitive. In order to prevent damage to electronic components through ESD, please take the precautions presented in this chapter whenever:

- Performing any work on a PCBs and equipment containing PCBs
- Removing subassemblies or components

What is ESD?

Static is the electrical charge created by the friction of two dissimilar materials moving against each other. Electro Static Discharge, or ESD, is the unintended dissipation of that charge, typically by short circuiting the charge to another device or to ground.

Our bodies can create as much as 25,000 volts of static electricity across our 100 to 250 picofarads of capacitance to ground. In the worst case work environment, voltages on some objects could exceed 50,000 volts. This more than exceeds the static-tolerance threshold of most transistors, resistors, op-amps, and digital computer chips. Some MOS families, for instance, can be damaged by a charge as low as 150 volts.

Usually the damage is such that it goes undetected for some time but eventually creates either an intermittent or hard failure in the field. Insulators, or non-conductors of electricity, pose the greatest static discharge threat to electronic devices because of their inability to bleed their static charges.

Becoming “Static Safe”

Equipment or component failures that result from ESD can be difficult to identify but can be avoided at minimal cost with proper handling techniques.

A static electricity-safe workplace is an environment in which anything that can generate static charges is eliminated or is drained of its charge. Such a workplace employs conductive and static dissipative materials for its table tops, floor surfaces, clothing, and material handling bins, boxes and bags. Machines, tools and test fixtures should be properly grounded. Technicians or anyone handling electronic components should wear wrist straps and even ankle straps at all times when working on or near ESD sensitive electronic modules, PCBs and devices.

GTECH has created this chapter to help you identify ESD failures and to implement correct handling procedures. Please read the following sections carefully.

ESD-Induced Failure Modes

Radiated Electromagnetic Fields

Radiated electromagnetic fields induce low-level voltages in unshielded signal conductors. These can cause intermittent unit halts from which the operator may recover. Older products are more sensitive to these fields. Products manufactured today are designed with covers and shielded external cables to protect them from most induced voltages.

Conducted Charges

Conducted charges (usually at points where the operator touches the unit) may transfer directly to components and result in either intermittent or permanent failures.

Typical Symptoms of ESD Damage

Hard failures such as blown semiconductor junctions, cracked oxide layers, fused metallization or bond wires can result from ESD, however, intermittent failures are the most common result of ESD. The device becomes temperature sensitive, input thresholds shift, output levels and drive ability degrade, etc.

Increased failure rates are also typical. Normal stresses such as temperature swings, power surges, or another “zap” could permanently disable a device previously exposed to ESD, even if no symptoms existed from the first exposure!

Common False Assumptions Concerning ESD

- **MYTH:** Only MOS devices are ESD sensitive.
  FACT*:* All semiconductor materials are sensitive to ESD. Some devices are just more sensitive than others.
- **MYTH*:*** A component cannot be damaged once it is installed in a board.
  FACT: It may be even more susceptible to induced fields due to the antenna effect of the etch or wire connected to it.
- **MYTH:** If the device works after I replaced it, I got lucky and did not damage it.
  FACT: Most failures are not catastrophic and only reveal themselves as intermittent or latent failures.
- **MYTH:** A grounded metal table top is a good anti-static work surface.
  FACT: A much better way to dissipate electrostatic fields is to use an anti-static mat and a 1-Megohm discharge current limiting resistor connected to earth ground so that the charge is drained in a controlled manner.

- **MYTH:** Wrist straps present a personal shock hazard when working on live circuits because they ground your body.
  FACT: As long as the 1-Megohm resistor is connected between the strap and the ground connection the wrist strap does not increase your risk of suffering a shock hazard. The 1-Megohm resistor limits the current to a safe value for low-voltage circuits.
- **MYTH:** We don't take precautions and we don't have ESD problems at our depot.
  FACT: You may not realize the damage that you are causing, but it is there. GTECH Engineering can determine if hard and intermittent failures are due to ESD damage by examining individual components, but such damage is not something that a technician can readily identify.
- **MYTH:** The GTECH terminal is not susceptible to static damage.
  FACT: Our terminals can be damaged or destroyed by static discharge just like any other electronic device.

ESD Precautions Checklist

Recommended Devices

- Wrist straps at the bench
- Wrist strap tester
- Only tools or parts made out of conducting materials (i.e., no plastic solder vacuums, tweezers, etc.).
- 3M® anti-static vacuum cleaners
- Static-dissipative mats connected to earth ground for bench tops and flooring
- Static-dissipative bags, boxes, bins and/or totes for handling PCBs (bags and totes must remain closed during transport - no part of the item can "stick out" of the bag or the bag is ineffective)
- Static-free floor mats, static-dissipative shelving, and 3M black conductive PCB storage bags used at all times (stockroom)

Precautionary Practices

- Minimize handling of components.
- Keep parts in static-dissipative packaging until ready for use.
- Use ESD-protective containers for handling and transporting small components.
- Handle IC's by the body, not the leads.
- Do not slide static sensitive devices over any surface.
- Eliminate static generators from your work area, for example plastic, vinyl, styrofoam, etc.
- Use a static-free workstation whenever handling parts in the office, in the field or anywhere.

Recommended Handling - Example

A typical scenario for a technician at a bench to properly retrieve parts from a stock area is as follows:

- You, the technician, are seated at a bench, connected to electrical ground via a wrist strap.
- The bench surface has a clean, grounded, static-dissipative bench mat connected to earth ground. All tools are conductive.
- When rising from the bench to retrieve a PCB (for example), disconnect the wrist strap.
- Proceed to the storage location and back to the bench, keeping the board in the existing, closed static-dissipative packaging.
- Re-attach the wrist strap, remove the board from the bag, and install it in the terminal, which is sitting on the static-dissipative mat.

NOTE!

After leaving and returning to the static-dissipative area, always reconnect to a static wrist strap connected to electrical ground before touching any static sensitive parts.

Proper Grounding Technique

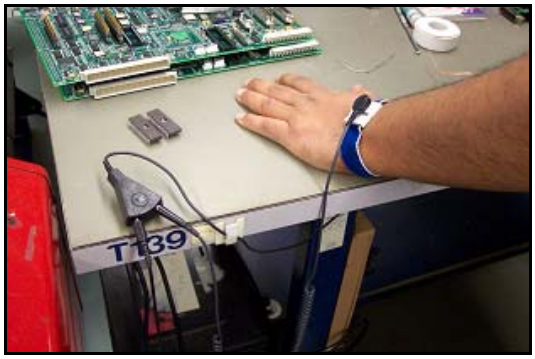
RLTs and FSTs must follow proper ESD precautions. This includes the items mentioned throughout this section: wrist straps, anti-static mats, anti-static vacuum cleaners, and antistatic bags.

- FSTs in the field must be grounded by a wrist strap connected to the terminal which in turn is connected to earth ground when servicing that terminal and all boards being transported must be stored enclosed within static-dissipative packaging.
- RLTs must work in a static-safe environment. The workbenches must have anti-static mats which are connected to earth ground and the RLT must observe proper ESD precautions, utilizing static wrists straps and proper anti-static packaging.

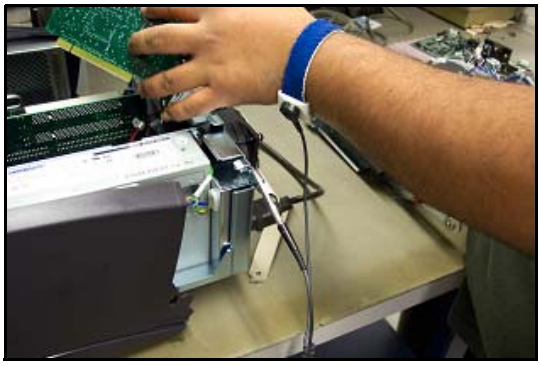
Note!

Vacuum cleaners are generators of static electricity. When purchasing a vacuum cleaner, choose one with an antistatic nozzle (such as the one recommended in the Spare Parts and Tools Chapter). If unable to purchase antistatic vacuum cleaners, the nozzle of the hose must be wrapped with antistatic (conductive) tape from the nozzle to the handle.

The picture below shows a properly grounded technician. Notice that the technician is grounded to the anti-static mat and the mat is grounded to earth ground at the AC outlet.



When servicing the terminal in the field the FST first must ground himself to the terminal chassis which is powered off and connected to earth ground, as shown in the picture below.



GTECH Manufacturing Specification

GTECH assemblies comply with IEC 61000-4-2 recommendations for severity typically in excess of level three. IEC stands for International Electrotechnical Commission. The specification is for Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment.

Part two specifies electrostatic discharge requirements and states that our equipment must withstand 15KV air discharges and 8KV contact discharges. Both positive and negative polarity discharges must comply.

PACKAGING

General Packaging Procedures

Package and ship all modules or devices in the packaging in which they were received from the manufacturer, whenever possible. Make sure that the packaging is in good condition and not damaged from previous shipping or handling.

- Circuit boards offer special problems and should be inspected for delicate components and sharp objects. Contact Manufacturing Engineering for assistance, if needed.
- All precautions must be made to insure that product that is shipped is not deformed or altered due to packaging used. Consideration must be given to the fragileness of the product that is shipped for total coverage of protective materials.
- Appropriate sized labels, elastic bands, or ESD tape must be used for securing ESD bags. Staples cannot be used.
- Multiple Circuit Card Assemblies' must be placed in a single static shielding bag only if they are mechanically separated with conductive or anti-static foam. No movement between assemblies can occur.
- As a priority, Circuit Card Assemblies' must be transported in slotted, conductive totes, with dividers spaced for tight capture. If boards are very short, anti-static bubble wrap or anti-static foam is used to prevent movement from slotting during handling. When conductive totes/dividers are not available, static shielding bags protect Circuit Card Assemblies'. Separation of Circuit Card Assemblies' by means of anti-static bubble or thin polyethylene foam sheeting is required. Fragile parts must be cushioned from one board to another and no ‘puncturing’ of ESD protection is allowed.
- All IC’s must be placed in anti-static tube holders that are cut to size; then, placed in static shielding bags for transit in kit or sales orders. Shielding bags must be fully closed and sealed. Static shielding bags may be replaced by conductive DIP tube shippers or bin boxes.
- IC’s that will not fit an IC tube must be placed in conductive foam. All IC legs are inserted in foam without deforming; then, placed in static shielding bags for transport in kit or sales orders. Shielding bags must be carefully closed and sealed properly.
- IC's must not be placed loose in bags.
- Parts which mark or scratch easily must use supplier packaging or must be separated by thin foam, polybag material or corrugated in a similar fashion to the original supplier packaging.

The same packing material is used for unpacking and packing the printer.

Description
Packset-M280 GTECH EPS (Figure A-1)
Cord - Power IEC 60320 (Figure A-1)
Carton - EPS Foam (Figure A-1)

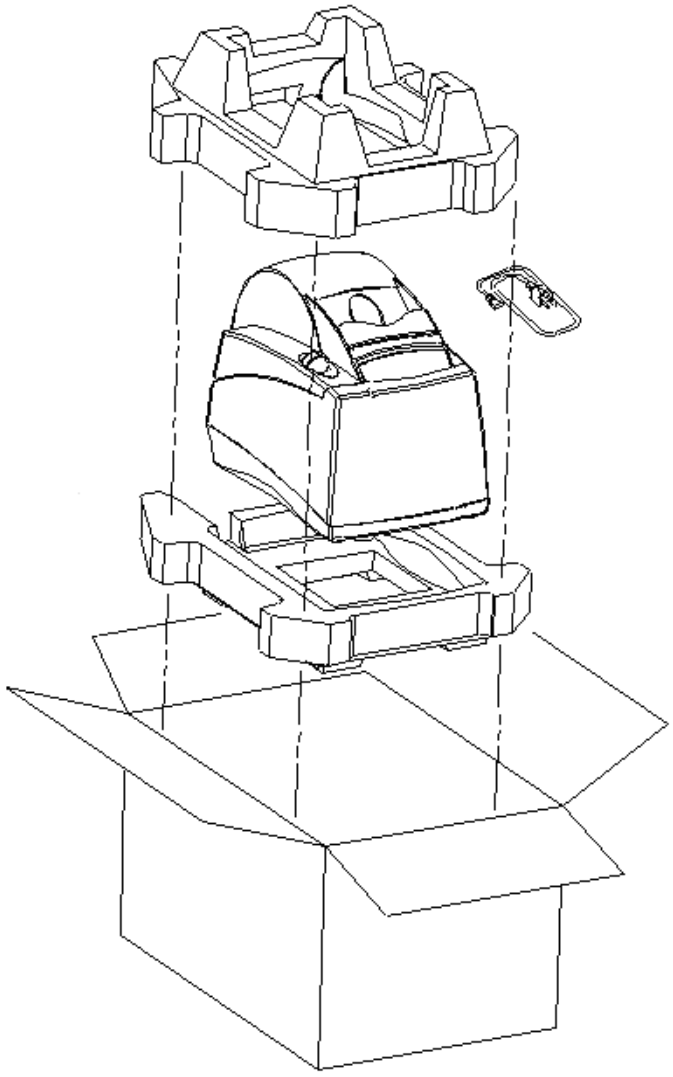


Figure A-1. Unpacking and Packing the Printer

B

Diagrams

The following page includes the block diagram for the Accutherm Ultra Printer. Please contact FSE Engineering, should you need additional information.

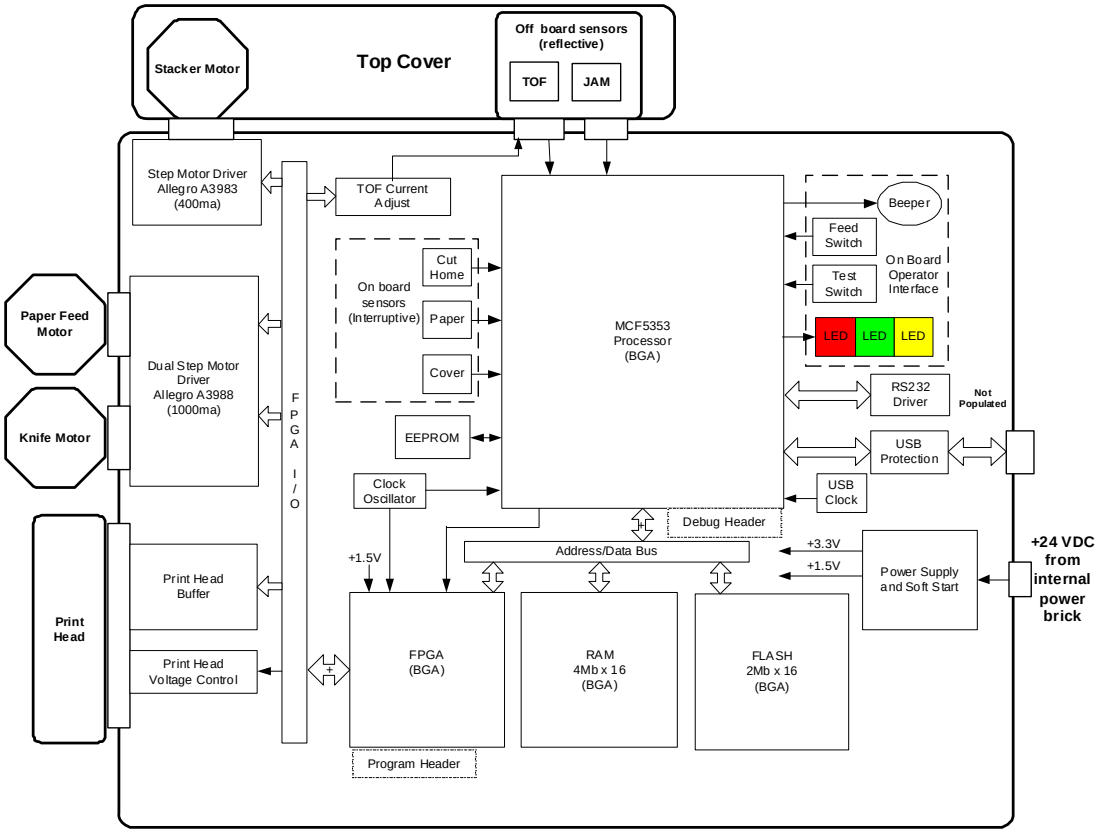


Figure B-1. Printer Block Diagram

C

Spare Parts and Tools

The following spare parts can be ordered by FST's in the field. More details for servicing continue in the next sections that discuss warranty and non-warranty service.

Table C-1. Spare Parts and Tools

Description
Pack Top 73-0830-03 (Part 1 in Figure C-1)
Pack Bottom 73-0830-02 (Part 4 in Figure 10-1)
Power Cord -IEC 60320 C5 TO C14 R/A (Part 2 in Figure C-1)
CABLE USB 2.0 (BLACK) 32-9088-01E
Power Supply-3 WIRE M280 ULTRA 50-0342-01E
CARTON-BROWN-SHIPPING 73-0830-01 (Part 3 in Figure 10-1)
#1 Phillips Screwdriver and extra #6 screws
91% Isopropyl Alcohol
Cotton Swabs

Table C-1. Spare Parts and Tools

Description
Soft Brush

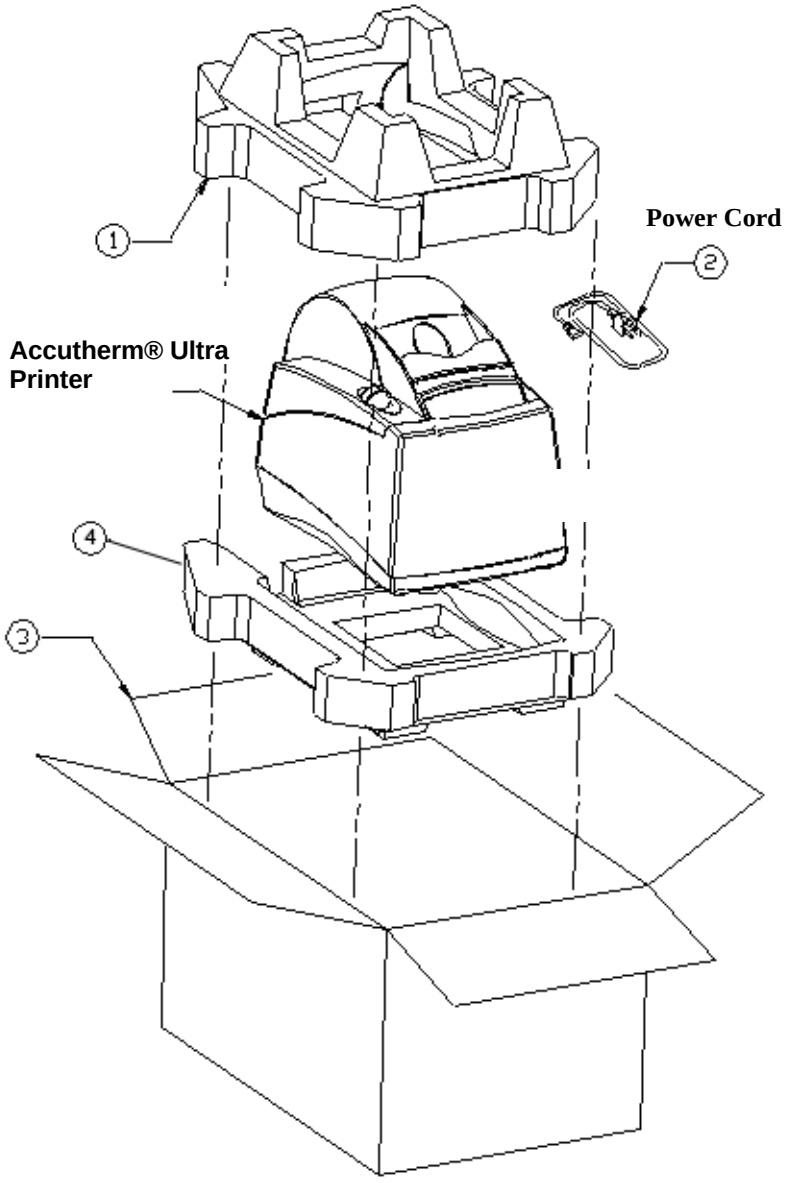


Figure C-1. Unpack/Pack the Printer

In-Warranty Service

The Accutherm Ultra Printer is manufactured by Transact Technologies located in Ithaca, New York. The printer is under warranty for a period of time determined by the warranty agreement for your site. Warranty agreements can be found in Documentum Webtop in the Field Service Engineering Cabinet.

Field Service Engineering>FSE Warranty Information

All warranty documents are listed in Part Number order.

Post-Warranty Service

The Accutherm Ultra is serviced by GTECH RLTs during the post-warranty period (please refer to the warranty agreement referenced above for warranty duration). Contact Field Service Engineering for a parts list specific to your jurisdiction.

Table C-2. Accutherm Ultra Spare Parts (Post-Warranty)

GTECH P/N	Description
10-1374-01	SCR M3X6 PNH PH
10-1368-01	NUT M3
10-2159-01	FOOT-BLACK RUBBER (BLACK)
11-3174-01	FRAME KNIFE ACCTHRM Ultra
11-3178-01	FRAME MAIN ACCTHRM Ultra
11-3177-01	GROUND KNIFE ACCTHRM Ultra
11-3175-01	GROUND ESD PLATEN ACCTHRM Ultra
11-3173-01	BRACKET TOF SENSOR ACCTHRM Ultra
12-0921-01	CLUTCH ASSY MOLDED ACCTHRM Ultra
12-0922-01	ASSY STACKER SHAFT STD ACCTHRM Ultra
12-0920-01	PIN DOWEL ACCTHRM Ultra
12-0919-01	SHAFT LATCH ACCTHRM Ultra
12-1035-01	LATCH ARM
15-1462-01	ASSY CUTTER BLADE ACCTHRM Ultra
15-1459-01	ASSY TOF SENSOR ACCTHRM Ultra
15-1461-01	ASSY PLATEN ACCTHRM Ultra
15-1458-01	ASSY PAPER JAM SENSOR ACCTHRM Ultra
15-1464-01	ASSY LEFT BEARING PLATE ACCTHRM Ultra
15-1457-01	ASSY POWER SUPPLY FERRITE ACCTHRM SUP
15-3741-01	LATCH ARM (ASSY)
16-1804-01	LATCH RIGHT ACCTHRM Ultra
16-1810-01	ASSY STACKER FRAME/PIN STD ACCTHRM SUP
16-1803-01	LATCH LEFT ACCTHRM Ultra
16-1797-01	ASSY LFT BEARNG PLATE/PLNGR ACCTHRM SUP
16-1796-01	ASSY RT BEARNG PLATE/PLNGR ACCTHRM SUP
16-1805-01	LEVER COVER RELEASE ACCTHRM Ultra
16-1798-01	ASSY BASE FRAME ACCTHRM Ultra
16-1815-01	GEAR 24 TOOTH ACCTHRM Ultra

GTECH P/N	Description
16-1814-01	GEAR COMBO 48/28 IDLER ACCTHRM Ultra
16-1813-01	GEAR COMBO 24/26 DRIVE ACCTHRM Ultra
16-1811-01	HOLDER HEAD SPRING ACCTHRM Ultra
16-1809-01	GEAR COMBO 14-28 ACCTHRM Ultra
16-1808-01	GEAR 36/18 TOOTH ACCTHRM Ultra
16-1807-01	GEAR 45/24 TOOTH ACCTHRM Ultra
16-1806-01	ROLLER IDLER ACCTHRM Ultra
16-1802-01	STACKER PAPER ACCTHRM Ultra
16-1801-01	FLAG PAPER OUT/COVER OPEN ACCTHRM SUP
16-1794-01	ASSY PAPER COVER ACCTHRM Ultra
17-0946-01	SPRING COMP PRINT HEAD ACCTHRM Ultra
17-0945-01	SPRING COMP STACKER TENSION ACCTHRM SUP
17-0944-01	SPRING LATCH ARM EXT ACCTHRM Ultra
17-0943-01	SPRING EXTENSION PAPER STACKER
17-1150-01	SPRING-PLUNGER
17-1151-01	PLUNGER-MIDFRAME
20-1247-01	ASSY PRINT HEAD ACCTHRM Ultra
20-1249-01	ASSY LINE FEED MOTOR ACCTHRM Ultra
20-1248-01	ASSY KNIFE MOTOR ACCTHRM Ultra
24-1791-01	ASSY-M280 ULTRA-TOF SENSOR
32-1282-01	CORD PWR IEC60320 C7 T0 C18 R/A Ultra
50-0291-01	POWER SUPPLY 24V ACCTHRM Ultra
51-1653-01	ASSY M280 CNTRLR BD ACCTHM Ultra
51-1654-01	ASSY M280 RS485 INTFC ACCTHRM Ultra

Ordering Spare Parts from Assembly Drawings

In the event that additional spare parts are needed the following section provides assembly drawings and GTECH part numbers. To order spares in this manner, ensure that the following considerations are made when referencing these drawings:

- GTECH P/N 97-1824-XX is the Bill of Materials that contains all printer spare parts for each model number. The last two digits (represented by a XX above) will vary by model. You should substitute the XX for the 2-digit suffix on your printer model.
- The parts list included in this section include all available mechanical parts for the Accutherm® Ultra printer. It is possible that replaceable parts are incorporated into a larger assembly in which you must replace the whole assembly rather than just an individual component.
- The part numbers and SAP descriptions in the following tables match the part description in the assembly drawings that they accompany. Match the description and select the GTECH part number.

The controller board (GTECH P/N 51-1653-XX) is repairable and should be returned to CRF for repair. A small number of boards can be purchased as seed stock.

Printer Assembly

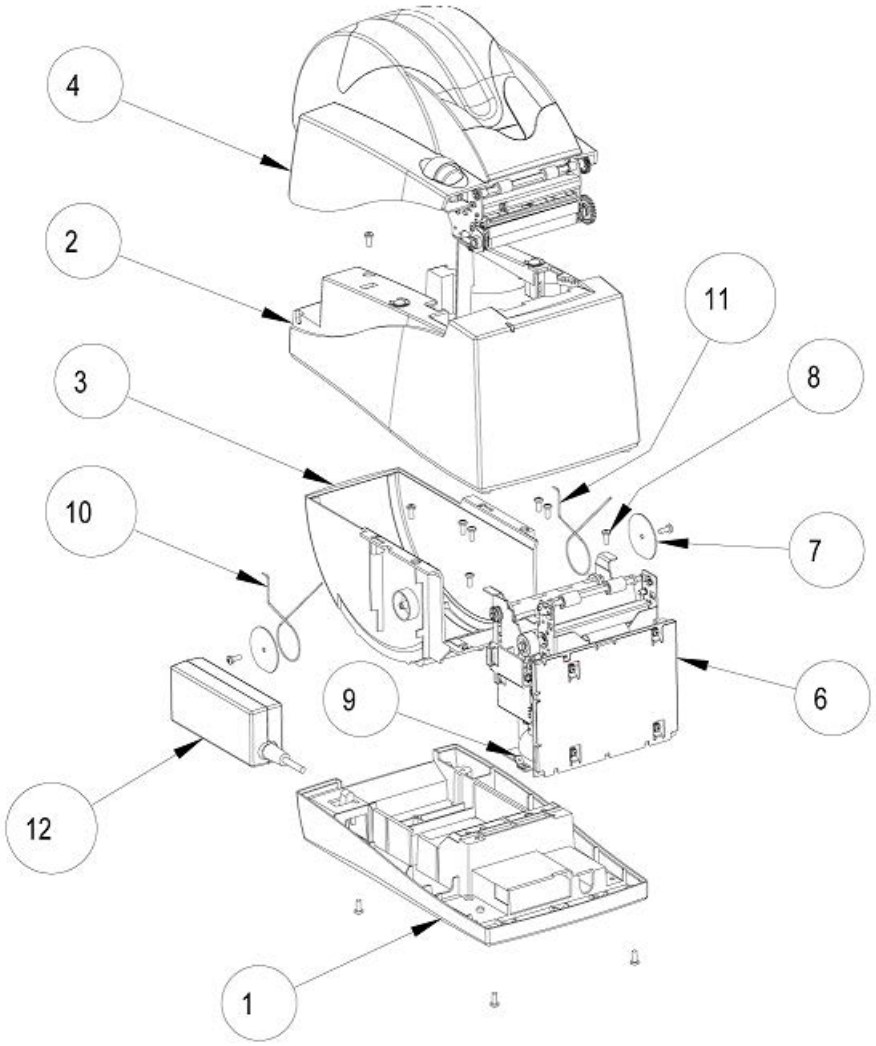


Table C-3. Printer Assembly

Number	Description	GTECH Part Number
1	ASSY - BASE	16-2054-01E
2	ASSY - MIDFRAME	16-2055-01E
3	ASSY - PAPER BUCKET	16-2056-01E

Table C-3. Printer Assembly

Number	Description	GTECH Part Number
4	COVER-PAPER (SeeTable C-8, “Assembly-Paper Cover (Mfg. #28-09955),” on page C-xii	16-2057-01E
	TYWRAP- 3 3/8” (MFG. Part # 98-0941)	10-2155-01E
6	MECHANISM ASSEMBLY - LOWER (SeeTable C-9, “Assembly-Lower Mechanism,” on page C-xiv	24-1786-01E
7	RETAINER - SLACKER SPRING	11-4271-01E
8	SCREW #6-20 X 3/8 THD CUT PHD PHPS	10-1366-01
9	TAB-FASTON .187 X .019 (MFG. # 98-03968)	10-1369-01
10	SPRING - SLACKER (LEFT)	17-1144-01E
11	SPRING - SLACKER (RIGHT)	17-1145-01E
12	POWER SUPPLY-3 WIRE CEC COMPLIANT	50-0432-01E

Table C-4. MISC/COMMON

Number	Description	GTECH Part Number
	CARTON-BROWN SHIPPING (Part # 90-7579)	10-1369-01
	POWER CORD-IEC320 C5 TO C14 (STRAIGHT)	98-10562L
	PACK-BOTTOM (Part # 28-09964)	73-0830-02
	PACK-TOP (Part # 28-09965)	73-0830-03
	# 6 X-18 X 1/4 TAP PHD PHPS (7)	MO67883-03

Assembly-Base (16-2054-01E)

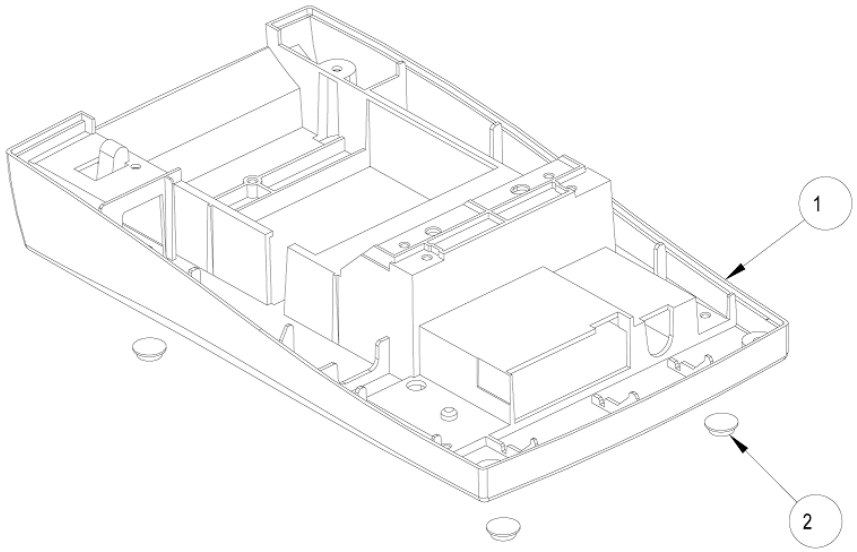


Table C-5. Assembly-Base (16-2054-01E)

Number	Description	Mfg. Part Number	GTECH Part Number
1	ASSY- BASE	28-09855	16-2054-01E
2	FOOT - RUBBER (BLACK)	98-04248	10-2159-01E

Assembly-Paper Bucket (16-2056-01E)

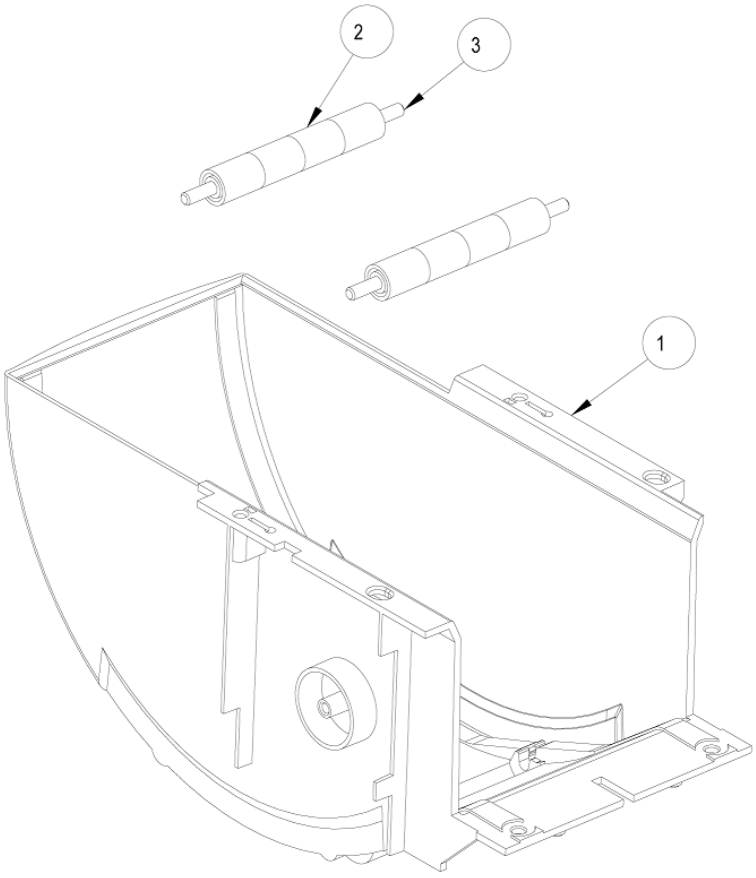


Table C-6. Assembly - Paper Bucket (16-2056-01E)

Number	Description	Mfg. Part Number	GTECH Part Number
1	ASSY- PAPER BUCKET	28-09872	16-2056-01E
2	ROLLER - EPIC 950TRANSPORT	95-04907	16-2071-01E
3	SHAFT - IDLER (PAPER BUCKET)	28-09862	16-2083-01E

Assembly - Mid-Frame (16-2055-01E)

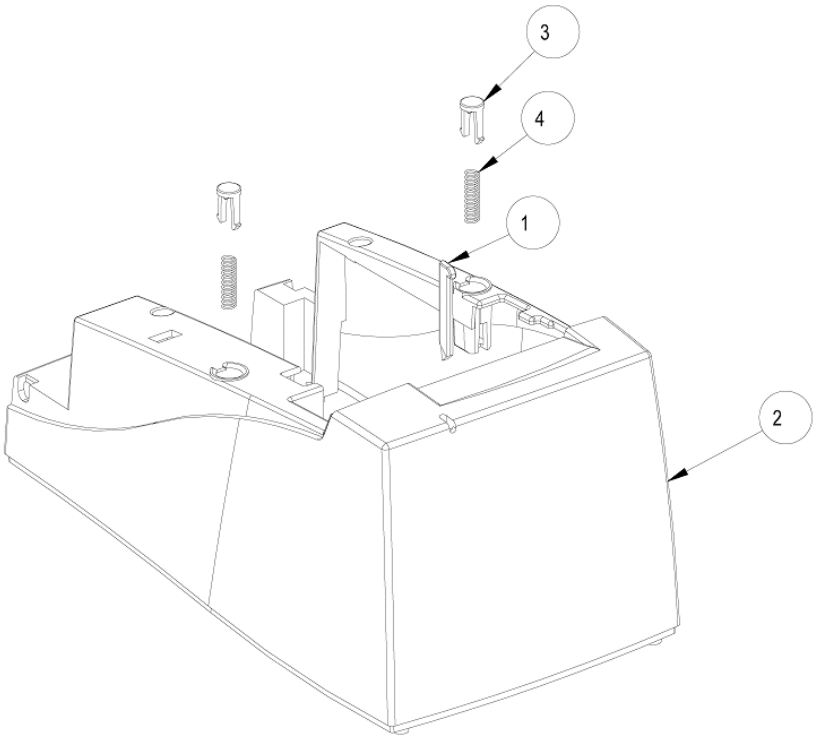


Table C-7. Assembly-Mid-Frame (16-2055-01E)

Number	Description	Mfg. Part Number	GTECH Part Number
	ASSY-MIDFRAME	28-09950	16-2055-01E
1	LENS - LED	28-09869	13-1040-01E
2	MIDFRAME - PRI NTER	28-09840	Substitute entire ASSY 16-2055-01E
3	PLUNGER - MIDFRAME	28-09873	17-1151-01E
4	SPRING- PLUNGER	28-09874	17-1150-01E

Assembly-Paper Cover

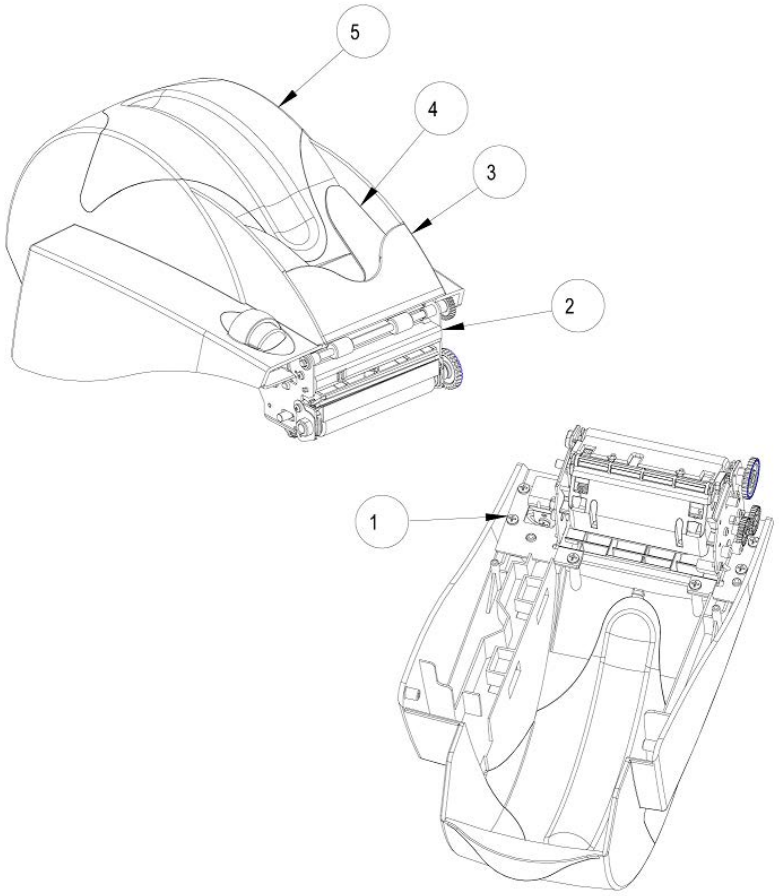


Table C-8. Assembly-Paper Cover (Mfg. #28-09955)

Number	Description	Mfg. Part Number	GTECH Part Number
1	ASSY- GROUND WIRE-M280 ULTRA	28-09177L	30-0133-01E
2	ASSEMBLY - KNIFE- FRAME (ASSY)	28-09730	15-3737-01E
3	COVER - PAPER	28-09845	16-2057-01E
4	DEFLECTOR - PAPER	28-09870	16-2058-01E
5	WINDOW - PAPER COVER	28-09867	16-2062-01E

Assembly-Lower Mechanism

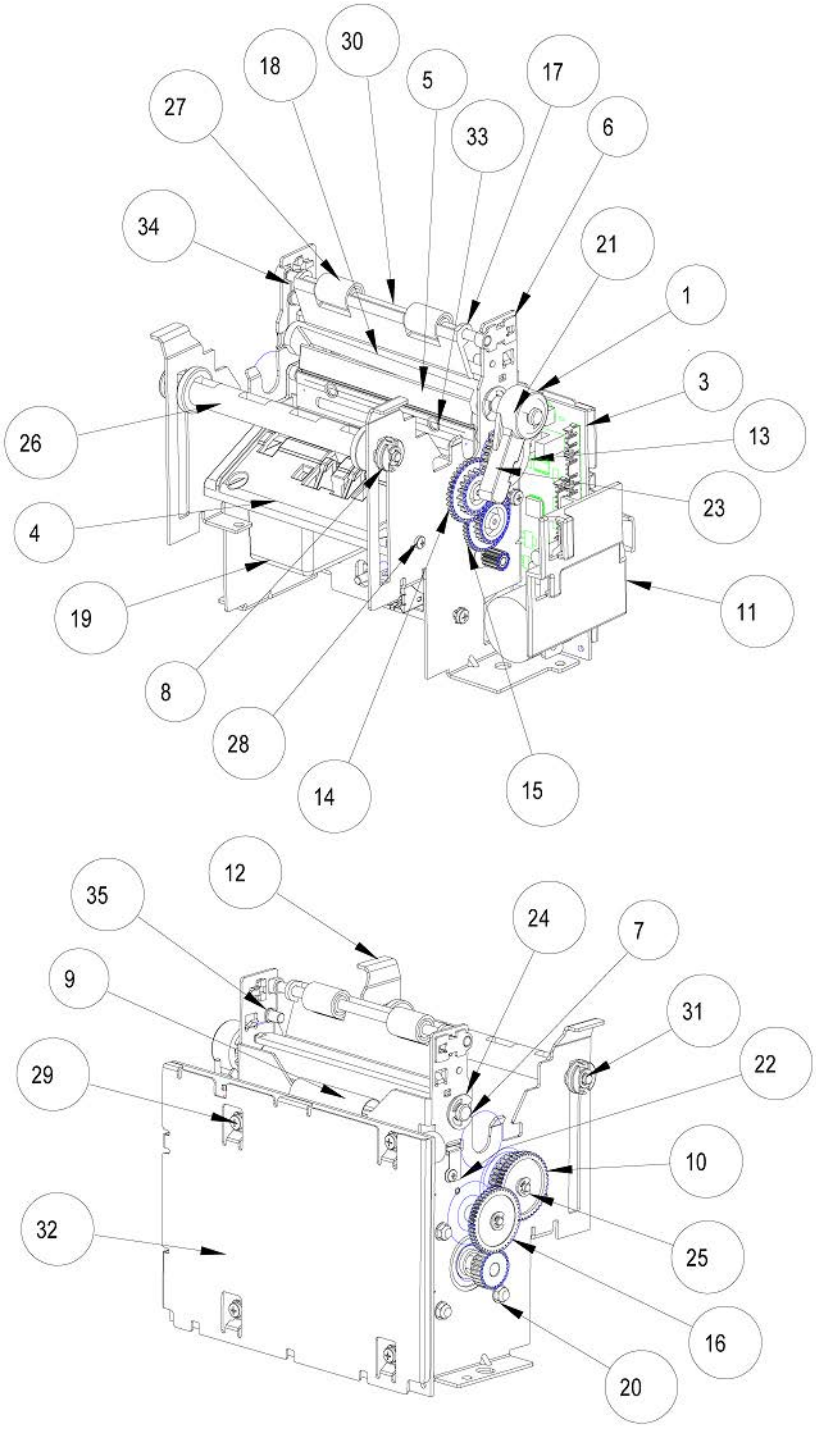


Table C-9. Assembly-Lower Mechanism

Number	Description	GTECH Part Number
1	ARM - ROTARY (Part # 28-09780)	16-2063-01E
2	ASSY - KNIFE MOTOR (Part # 28-00760)	20-1248-01
3	ASSY - PCB ACCUTHERM ULTRA (28-09185L)	24-1788-01E
4	ASSY - PAPER PATH (Part # 28-09735)	15-3746-01E
5	ASSY - PRINT HEAD (Part # 28-09677)	24-1789-01E
6	BEARING - COMPENSATION (VALIDATION) (Part # 25-07499)	16-2066-01E
7	BEARING - KNIFE (ROTATIVE) (Part # 25-09784)	12-1026-01E
8	BUSHING SLACKER (Part # 28-09669)	13-1028-01E
9	CABLE - FLAT FLEXIBLE (Part # 28-04036)	32-1406-01
10	GEAR-COMBO 48/28 IDLER (Part # 28-03705)	16-1814-01
11	COVER - GEAR (Part # 28-09674)	16-2067-01E
12	FRAME ASSY (MECHANISM) (Part # 28-09689)	15-3747-01E
13	GEAR - 24 TOOTH (Part # 28-03703)	16-1815-01
14	GEAR - 36/18 TOOTH (Part # 28-03780)	16-1808-01
15	GEAR 45/24 TOOTH (Part # 28-03782)	16-1807-01
16	GEAR - COMBO 26/46 DRIVE (Part # 28-03707)	16-1813-01
17	GUIDE - SLACKER (Part # 28-09685)	16-2068-01E
18	BLADE-KNIFE ROTATIVE (Part # 28-09776)	15-3748-01E
19	ASSY-FEED MOTOR M280 ULTRA (Part # 28-09683)	24-1790-01E
20	NUT - M3 HEX W/LOCKWASHER (Part # 98-0621)	10-1368-01
21	PIN-KNIFE ARM (Part # 28-09786)	16-2069-01E
22	GROUND PRINT HEAD (RIGHT) (Part # 28-09711)	11-4268-01E
23	GROUND PRINT HEAD (LEFT) (Part # 28-09712)	11-4269-01E
24	RETAINER-E RING.25 DIA.	10-2146-01E
25	RETAINER-E RING .125 DIA.	10-2147-01E

Table C-9. Assembly-Lower Mechanism

Number	Description	GTECH Part Number
26	RETAINER-E RING .156 DIA.	10-2148-01E
27	ROLLER - SLACKER (Part # 28-09948)	16-2070-01E
28	ROLLER - EPIC 950 TRANSPORT (Part # 95-04907)	16-2071-01E
29	SCREW - #4 PLASTIC THREAD FORMING	10-2150-01E
30	SCREW - M 3 X 6 MM SEMS PHD PHPS (Part # 98-02215)	10-2153-01E
31	SHAFT - TENSIONER (Part # 28-09691)	12-1024-01E
32	SHAFT - SLACKER (Part # 28-09692)	12-1025-01E
33	SHIELD -PCB (Part # 28-09833)	11-4270-01E
34	SPRING - PRINT HEAD COMPRESSION (Part # 28-03765)	17-0946-01
35	SPRING - VALIDATION COMPENSATION LEFT (Part # 25-07772)	17-1142-01E
36	SPRING - VALIDATION COMPENSATION, R (Part # 25-07773)	17-1142-01E

Assembly-Knife/Slacker (15-3737-01E)

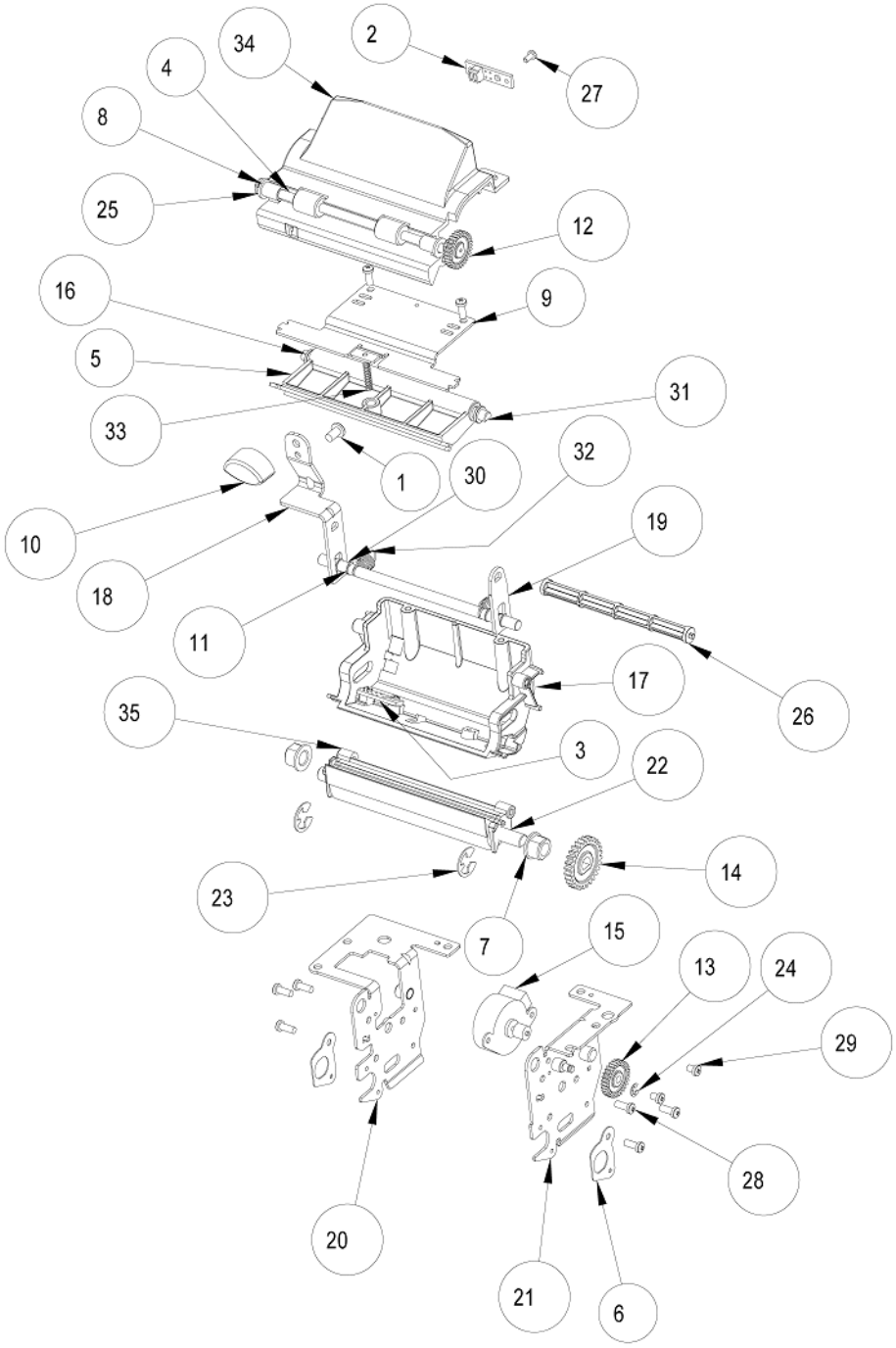


Table C-10. Assembly-Knife/Slacker (15-3737-01E)

Number	Description	Mfg. Part Number	GTECH Part Number
1	# 6 X-18 X 1/4 TAP PHD PHPS	MO67883-03	10-2144-01E
2	ASSY - JAM SENSOR M280 ULTRA	28-09151L	20-1307-01E
3	ASSY-M280 ULTRA TOF SENSOR	28-08445L	24-1791-01E
4	DRIVE SHAFT (ASSY)	28-09749	15-3738-01E
5	MOLDED FIXED BLADE GTECH (ASSY)	28-06806	15-1462-01
6	BEARING - PLATEN (RETAINER)	28-09827	17-1134-01E
7	BEARING PLATEN (M280)	28-09752	17-1135-01E
8	BEARING - PLATEN (950 SERIES)	95-04963	17-1136-01E
9	BRACKET - KNIFE SPRING	28-09748	17-1137-01E
10	BRACKET LATCH - ARM	28-09771	16-2085-01E
11	BUTTON - PAPER COVER	28-09850	16-2059-01E
12	RING-E .188 DIA	98-1390	10-1370-01
13	GEAR-30 TOOTH	28-09698	13-1025-01E
14	GEAR-30T-DRIVE	28-09701	13-1026-01E
15	GEAR - PLATEN	28-09744	13-1027-01E
16	ASSY-M280 ULTRA STACKER MOTOR	28-09173L	24-1785-01E
17	HUB - LATCH	28-09738	15-3740-01E
18	KNIFE - FRAME	28-09729	11-4273-01E
19	LATCH - ARM	28-09772	12-1035-01E
20	LATCH ARM - ASSY	28-09819	15-3741-01E
21	PLATE SIDE - LEFT (ASSY)	28-09767	15-3743-01E
22	PLATE SIDE - RIGHT (ASSY)	28-09765	15-3744-01E
23	PLATEN	28-09825	15-3745-01E
24	RETAINER -E-RING .25 DIA.	520-9800006	10-2146-01E
25	RETAINER -E-RING .125 DIA.	520-9800002	10-2147-01E
26	RETAINER -E-RING .156 DIA.	520-9800003	10-2148-01E

Table C-10. Assembly-Knife/Slacker (15-3737-01E)

Number	Description	Mfg. Part Number	GTECH Part Number
27	ROLLER - PAPER	28-09762	11-42740-01E
28	SCREW - #2 PLASTIC THREAD FORMING	98-09826	10-2149-01E
29	SCREW - #4 PLASTIC THREAD FORMING	98-7608	10-1376-01
30	SCREW - M2.6 X 4 PHD PHPS	98-1182	10-2151-01E
31	SCREW - M3 X 6MM PHPS PHD	98-0611	10-2165-01E
32	SHAFT - LATCH	28-10718	12-1022-01E
33	LATCH ARM (ASSY)	28-09819	15-3741-01E
34	SPRING - LATCH BAR	28-09740	17-1138-01E
35	SPRING - FIXED BLADE (ULTRA)	28-10637	17-1139-01E
36	COVER STACKER-MOTOR	28-09697	16-2060-01E
37	STRIPER-PLATEN	28-09741	16-2061-01E

Assembly-Paper Path (15-3746-01E)

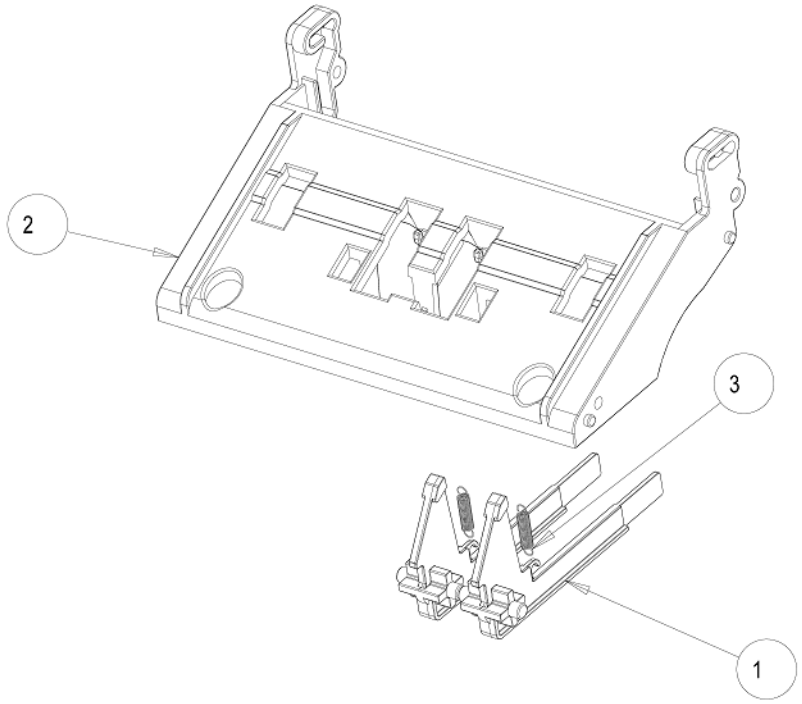


Table C-11. Assembly - Paper Path (15-3746-01E)

Number	Description	GTECH Part Number
1	FLAG - PAPER OUT/COVER OPEN (Part # 28-10197)	16-2064-01E
2	GUIDE-PAPER (BOTTOM) (Part # 28-09736)	16-2065-01E
3	SPRING - FLAG EXTENSION (Part # 28-03952)	17-0943-01

Tools List

- #1 Phillips head screwdriver
- Multimeter
- Flat head screwdriver
- Needle-nosed pliers
- Cotton Swabs
- 91% Isopropyl Alcohol
- 5.5mm Nut Driver or Wrench

D

Product Safety & Approvals

Safety Instructions

- The terminal may only be installed by qualified, trained personnel.
- Field Service Manuals and Retailer Reference Guides for the terminal are provided at the time of training.
- If the terminal was stored in a cold environment, condensation can occur. In order to prevent condensation, wait for the terminal to acclimate to the temperature for 3 to 4 hours before opening the package.
- Verify that the terminal nominal voltage matches the voltage of the local line to which it is being installed.
- This terminal is equipped with a safety-tested power cable and may only be connected to a grounded power outlet.
- Ensure that the power outlet to which the terminal is being connected is freely accessible.
- Always grip the cable plugs to remove them from outlet, never pull the power or data cables from the sockets by the cables.
- Lay leads and cables so that no one can stand on or trip over them.

- Data transmission lines must not be connected or disconnected during a thunderstorm.
- Ensure that no objects (e.g. jewelry, paper clips, etc.) are allowed to drop inside the terminal.
- In the case of an emergency (e.g. damaged housing, operating elements or power cable, entry of moisture or objects), switch off the terminal, pull out the power cable and contact the responsible customer support department.
- Repairs or modifications to the terminal may only be carried out by qualified, trained personnel.
- Unauthorized opening of the terminal and repairs may result in considerable danger, as well as jeopardize the warranty coverage.

Radio Interference

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, persuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numerique de la classe A respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.

European Union

Warning: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Telecom

Caution: To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.

Attention: Pour réduire les risques d'incendie, utiliser uniquement des conducterurs de télécommunications 26 AWG au de section supérleure.

FCC

(Only for equipment bearing an FCC part 68 label)

This equipment complies with Part 68 of the FCC rules. On the equipment is a label that contains, among other information, the FCC registration number and Ringer Equivalence Number (REN) for this equipment. If requested, this information must be provided to the telephone company.

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the REN's should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determine by the total REN's, contact the telephone company to determine the maximum REN for the calling area.

For Digital Data Services (DDS) modems, use Facility Interface Codes 04DU5-24, 04DU5-48, 04DU5-96, 04DU5-19 and Service Order Code 6.0F.

If the terminal equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC is you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If trouble is experienced with this equipment, please contact the following for repair and/or warranty information.
GTECH Corporation
55 Technology Way, West Greenwich, RI 02817
Telephone:(401) 392-1000

If the trouble is causing harm to the telephone network, the telephone company may request that you remove the equipment from the network until the problem is resolved.

GTECH Corporation must make any necessary repairs to modem portion of this equipment in order to maintain valid FCC registration. Do not attempt to repair or service your modem, return it to GTECH Corporation.

This equipment cannot be used on public coin service provided by the telephone company. Connection to Party Line Service is subject to state tariffs.

Industry Canada

(Only for equipment bearing an Industry Canada label)

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100."

Replaceable Batteries

There is a risk of explosion if a battery is replaced by an incorrect type. Always dispose of used batteries according to the instructions on the particular type of battery.

Wireless Device Option

The wireless option for the GT1200 uses and approved Azurewave Technologies mini-PCIe module (Model# AW-NE762H; FCC ID: VQF-RT3090-1T1R) operating in the 2.4GHz frequency range and is in compliance with the 802.11 b/g/n communication protocol standards. For a complete list of approved companies, refer to GTECH part number 55-0115-01E.

E

Acronyms & Abbreviations

AC	Alternating Current
aka	Also known as
AL	Analog Loopback
APB	Analog Processing Board
AT	Advanced Technology
BERT	Bit Error Rate Tester
BIOS	Basic Input Output System
bps	Bits per Second
C	Celsius
CCD	Charge Coupled Device
CCFT	Cold Cathode Fluorescent Tube
CCITT	The International Telegraph and Telephone Consultive Committee
CE	Conformite' Europeene [CE marking w/in the European Union (EU)]
CFR	Code of Federal Regulations
CIS	Contact Image Sensor
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit
CSA	Canadian Standards Association

CSU/ DSU	A modem that is typically used with AT&T DDS service or a similar service provided by another carrier.
CTR	Common Technical Regulation
CTS	Clear to Send
CTs	Color Touchscreen
dB	Decibels
dBa	Adjusted Decibel
dBm	Decibels referenced to 1 mWatt
DC	Direct Current
DCD	Data Carrier Detect
DCE	Data Communication Equipment
DDS	Digital Service is a network service offered by AT&T. This is also an acronym for Digital Data Service.
degrees C	Degrees Centigrade
DFMA	Design for Manufacturability and Assembly
DIMM	Dual In-line Memory Module
DMA	Direct Memory Access
DOC	DiskOnChip
dots/mm	dots per millimeter
DPB	Digital Processing Board
dpi	Dots per Inch
DPST	Double Pole Single Throw
DRAM	Dynamic Random Access Memory
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTR	Data Terminal Ready
DUART	Dual Universal Asynchronous Receiver Transmitter
ECO	Engineering Change Orders
ECP	Enhanced Capabilities Port
EDO	Extended Data Out
EEPROM	Electrically Erasable Programmable Read Only Memory
EEROM	Electronically Erasable Programmable Logic Device
EFT	Electrical Fast Transients
EIDA	Enhanced Integrated Drive Electronics
EIDE	Extended Integrated Drive Electronics
EMC	Electromagnetic Capability
EMI	Electromagnetic Interference
EPA	United States Environmental Protective Agency
EPLD	Electronically Programmable Logic Device
EPP	Enhanced Parallel Port
EPROM	Erasable Programmable Read Only Memory

ESD	Electrostatic Discharge
ETSI	European Telecommunications Standards Institute
F	Fahrenheit
FCC	Federal Communications Commission
FCC Part 15	This agency approval ensures that the device does not cause excessive interference with other devices likely to be found in a commercial environment.
FCC Part 68	This agency approval ensures that the device, when connected to the telephone network, will not harm the network or network personnel.
FBNK(X	Flash Bank (Bit Number)
FDD)	Floppy Disk Drive
FFC	Flat Flex Cable
FIFO	First in First out
FPG	Flash Page
FST	Field Service Technician
GRUB	Grand Unified Boot Loader
GUTS	GTECH Universal Tracking System
HDD	Hard Disk Drive
Hz	Hertz (Cycles per Second
IC	Integrated Circuit
ID	Identification
in	Inches
IPC	Institute of Printed Circuits
IPS	Inches per Second
IR	Infrared
ISA	Industry Standard Architecture
ISO	International Standards Organization
ITU	International Telecommunications Union (formerly the CCITT)
kb	Kilobyte
kg	Kilogram
LAN	Local Area Network
LCD	Liquid Crystal Display
LCS	Loop Current Sense
LED	Light Emitting Diode
LIF	Low Insertion Force
LPTL	ine Printer
LVDS	Low Voltage Differential Signal
mA	milli-Amperes
MA	Memory Address
MB	Megabyte
MCU	Micro controller Unit

MDP	Modem Data Pump
MIDI	Musical Instrument Digital Interface
mm	Micrometer
mm/sec	Millimeter per second
MMX	Multimedia Extensions
ms	Millisecond
MTBF	Meantime Between Failures
MTTR	Mean Time to Replace
ns	Nanosecond
NVRAM	Non-volatile Random Access Memory
OCR	Optical Character Recognition
OEM	Original Equipment Manufactured
OH	Off-Hook
OM	Open Architecture Modular Package
OS	Operating System
OTP	One-Time Programmable
PC	Personal Computer
PCB	Printed Circuit Board
PCI	Peripheral Communications Interface
PCMCIA	PC Memory Card International Association
PFD	Power Fail Detect (generated by power supply)
PIT	Paper in Throat
PSTN	Public Switched Telephone Network
PTC	Positive Temperature Coefficient (Type Fuse)
RAM	Random Access Memory
RAP	Read-After-Print
RDCLK	Receive Data Clock
RDL	Remote Digital Loopback
RI	Ring Indicator
ROM	Read Only Memory
RS232	EIA RS232 Electrical Standard
RTS	Request to Send
RxD	Receive Data
SA	Stand Alone
SAW	Surface Acoustic Wave
SCC	Serial Communications Controller
SIMM	Single In-Line Memory Module
SO-DIMM	Small outline DIMM
SPDT	Single Pole, Double Throw
SPGA	Staggered Pin Grid Array
SPKR	Speaker

SRAM	Static Random Access Memory
TDCLK	Transmit Data Clock
TFT	Thin Film Transistor
TTL	Transistor-Transistor Logic
TUV	Technischer Uberwachungs Verein
TxD	Transmit Data
UART	Universal Asynchronous Receiver Transmitter
UL	Underwriter's Laboratory
us	microsecond
USB	Universal Serial Bus
V	Volt
VAC	Voltage Alternating Current
VCC	+5V Supply Voltage
VDC	Voltage Direct Current
VFD	Vacuum Fluorescent Display
VGA	Video Graphics Array
Vpen	Voltage Program Enable
Vrms	Voltage root means squared
WAN	Wide Area Network
WE	Western Electric
XPB	Transport Controller Board
XTCLK	External Transmit Clock
ZIF	Zero Insertion Force